

ATTACHMENTS

ATTACHMENT A
RESUME OF JOHN E. SEVEE

JOHN E. SEVEE

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EDUCATION

University of Vermont - B.S. in Civil Engineering, 1971

University of Vermont - M.S. in Geotechnical Engineering, 1973

University of Southern Maine - B.A. in Physics, 1994

PROFESSIONAL REGISTRATION

Professional Engineer - Maine, New Hampshire, Massachusetts, Florida, New Jersey, Ohio, North Carolina, South Carolina, Georgia, Connecticut, Pennsylvania, and Indiana

Certified Geologist - Maine

AFFILIATIONS

Association of Ground Water Scientists and Engineers, National Water Well Association, Member

American Society of Civil Engineers, Member

American Geophysical Union, Member

Formerly adjunct instructor at University of Southern Maine, in Engineering, Hydrogeology, and Contaminant Fate and Transport

EMPLOYMENT HISTORY

Currently from 1985 - Sevee & Maher Engineers, Inc. President

1985 from 1979 - E.C. Jordan Company, Portland, Maine, Manager of Earth Sciences and Geohydrologic Services

1979 from 1973 - Ardaman and Associates, Inc., Orlando, Florida, Project Geotechnical Engineer

EXPERIENCE

Directed a variety of hydrological, geohydrological, geochemical, geotechnical and hazardous waste investigations, including CERCLA and RCRA sites. These projects routinely have involved multidisciplinary efforts of laboratory analytical services, geotechnical engineers, solid and hazardous waste engineers, geophysicists, soil boring contractors, geochemists, monitoring well and piezometer installation contractors, geologists, structural engineers, architects, planners, water resource engineers, biologists, and/or waste water engineers. Managed a department with up to 30 geophysicists, soil scientists, geologists, geohydrologists, geotechnical engineers, and a geotechnical laboratory. Worked on projects located throughout the United States, and various parts of Canada, Russia, Middle East, Africa, and South America. Project budgets have ranged in excess of \$30 million.

Typical projects in various areas of expertise include:

- responsible for field investigations and interpretation of geohydrologic data at uncontrolled hazardous waste sites where heavy metals, solvents, etchants, coal tars and other chemicals were improperly stored and disposed, including recommendations for cleanup,
- responsible for collection, review, and statistical analysis of water quality and soil quality data and assessment of environmental risk,
- use of stable isotopes to date groundwater and trace chemical plumes in groundwater,
- geochemical evaluation of natural and impacted other waters including geochemical modeling for compounds such as arsenic, mercury, and metals,
- design and construction of groundwater and soil remediation systems (including organic chemicals, such as VOCs, SVOCs, BETX; metals such as mercury), including pump and treat, in situ biodegradation, and excavation,
- investigations and remediation of chlor-alkalie facilities,
- hydrogeologic and contaminant assessments on fourteen Superfund sites, including Remediation investigations (RI) and Feasibility Studies (FS),
- groundwater resource studies requiring interpretation of the geologic setting, analysis of aquifer yield characteristics, fracture analysis, well-head protection, and saltwater intrusion,
- use and development of finite difference and finite element computer models for simulation of groundwater and chemical transport,
- investigations requiring installation of multi-level wells for groundwater flow determination and quality sampling,
- land disposal and groundwater recharge investigation involving evaluation of impacts on surface water and groundwater,
- geohydrologic and geotechnical investigations for the siting, design, and license application of solid waste landfills for mining waste, municipal wastes, hazardous wastes (including organic chemicals, such as VOCs, SVOCs, BETX; metals such as mercury), papermill wastes and ash, including negotiations and public participation during the permitting process,
- a broad variety of geotechnical projects including foundation investigations for buildings, tanks, and heavy industrial facilities, design of earthen dams and retaining walls, and slope stability,
- slope stability and dam stability analyses including seismic assessment,
- tailings pond geotechnical design and impact assessment on groundwater and surface water quality, mine dewatering analyses, injection well design, stability and settlement analyses,
- design and construction of groundwater collection systems to remediate groundwater at landfills and hazardous waste sites,

- impact assessments for oily waste disposal areas and solid waste landfills,
- negotiations with state and federal regulatory agencies and permitting assistance,
- a broad variety of geotechnical projects including foundation investigations for buildings, tanks, and heavy industrial facilities, design of earthen dams and retaining walls, and slope stability, and
- expert testimony.

PUBLICATIONS AND PRESENTATIONS

"Shear Strength Anisotropy in a Laminated Silt," Masters Thesis, University of Vermont, 1973.

"Silresim: A Hazardous Waste Case Study." Presented to the Management of Uncontrolled Hazardous Waste Sites Conference, November 29 - December 1, 1982, with John D. Tewhey.

"Cost-Effectiveness Studies of Ground-Water Clean-up at Hazardous Waste Sites." Presented to Conference on Ground-Water Investigations and Policy in Maine, Augusta Civic Center, 1983.

"Use of Computer Groundwater Modeling Techniques in the Design of a Monitoring Program at a Hazardous Waste Superfund Site." Presented to the Fourth National Symposium and Exposition on Aquifer Restoration and Ground Water Monitoring, May 23-25, 1984, with Ron A. Lewis.

"Groundwater Control During Construction of a Roadway Access on Uncontrolled Coal Tar Disposal Site." Presented to Eastern Regional Groundwater Conference, National Water Well Association, 1984, with Earl G. Hill.

"Economic Considerations for Siting Solid Waste Landfills." 1985 TAPPI National Convention, with Richard Saucier.

"Monitoring Wells-A Case History Anthology," Presented to the National Water Well Association Short Course on Ground Water and Unsaturated Zone Monitoring and Sampling, 1985, Portland, Maine.

"Geohydrologic Considerations of Large Wastewater Disposal Systems and High-Density Individual Systems," Presented to 1987 Annual Site Evaluators Meeting, Augusta Civic Center.

"Rehabilitation of Monitoring Wells on an Organic Chemical Spill Site." 1987 Symposium on Standards Development for Ground Water and Vadose Zone Monitoring Systems, ASTM Subcommittee D18.21, with Peter Maher.

"Sources of Groundwater Contamination," March 1988, Maine Section American Society of Civil Engineers, Maine Ground Water Issues.

"Methods and Procedures for Defining Aquifer Properties", Chapter 10 in "Practical Handbook of Ground-Water Monitoring," Editor David Nielson, Lewis Publishers, Inc., 1991.

"Subdivision Review and Residential Development," Presented to Planners and State Employees of Maine working in areas of groundwater protection; sponsored by Southern Maine Regional Planning Commission, June 1990.

"Hydrogeology and Environmental Geology of the Gray Delta Complex," 1996, with Andrew Tolman, Katherine Bither, Fred Beck, Martha Mixon, and Tom Weddle, presentation at New England Intercollegiate Geologic Conference.

"Groundwater Behavior in the Bedrock of Maine," in Bulletin 4, Selected papers on the Hydrogeology of Maine, Geological Society of Maine, 1996.

"An Analysis of Low-Flow Ground Water Sampling Methodology," with Carol White and David Maher, Ground Water Monitoring Review, Spring 2000.

"Predicting the Environmental Effects from Short Paper Fiber and Biosolids Use in Manufactured Topsoil," J. Sevee, P.E., C.G.; A.W. Thayer, C.G.; A. Duran, Ph.D.; E.R. Myers; and J.C. Brinck, November 2007.

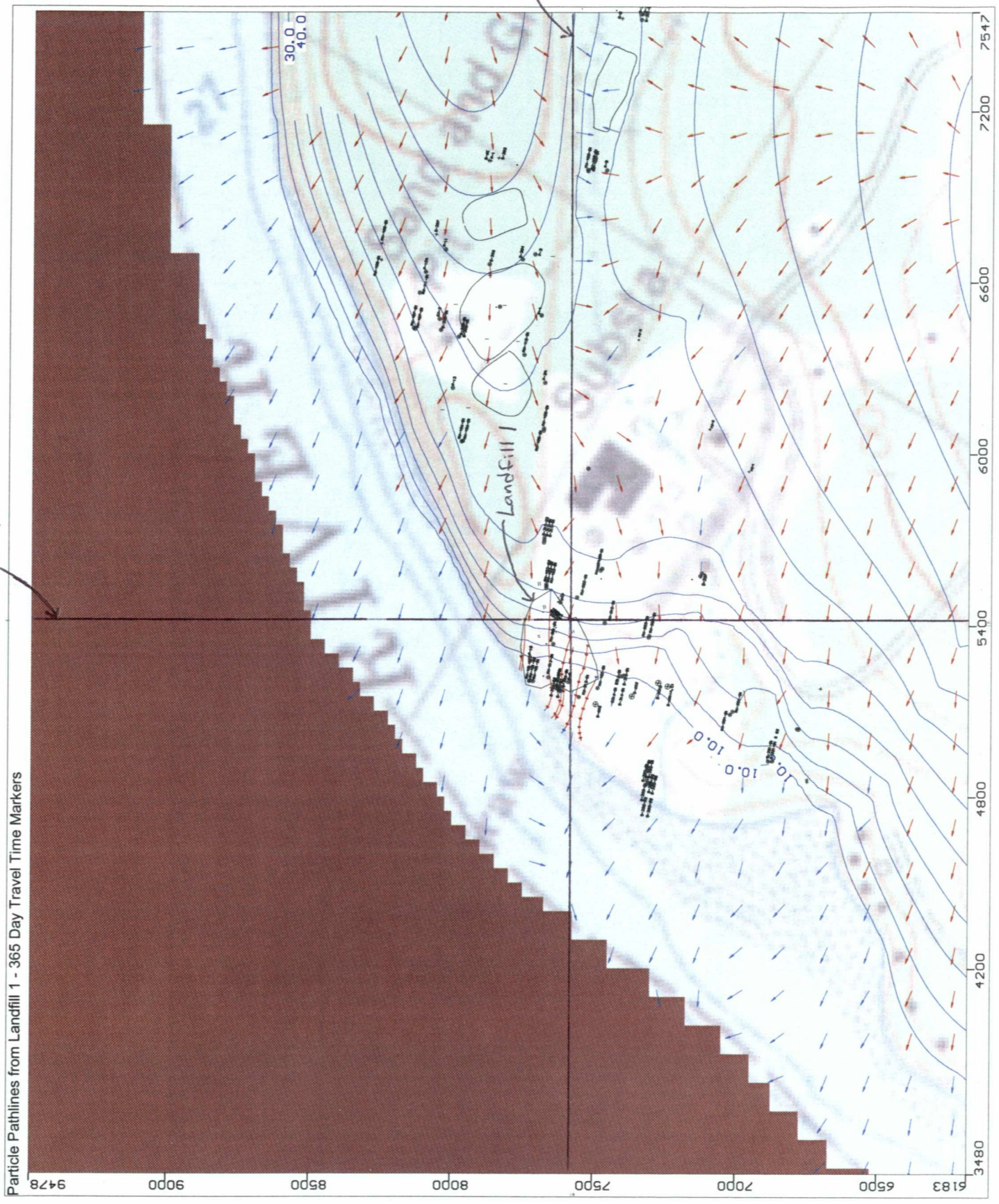
"Effective Porosity Measurement of a Marine Clay," submitted to ASCE Journal of Environmental Engineering.

ATTACHMENT B

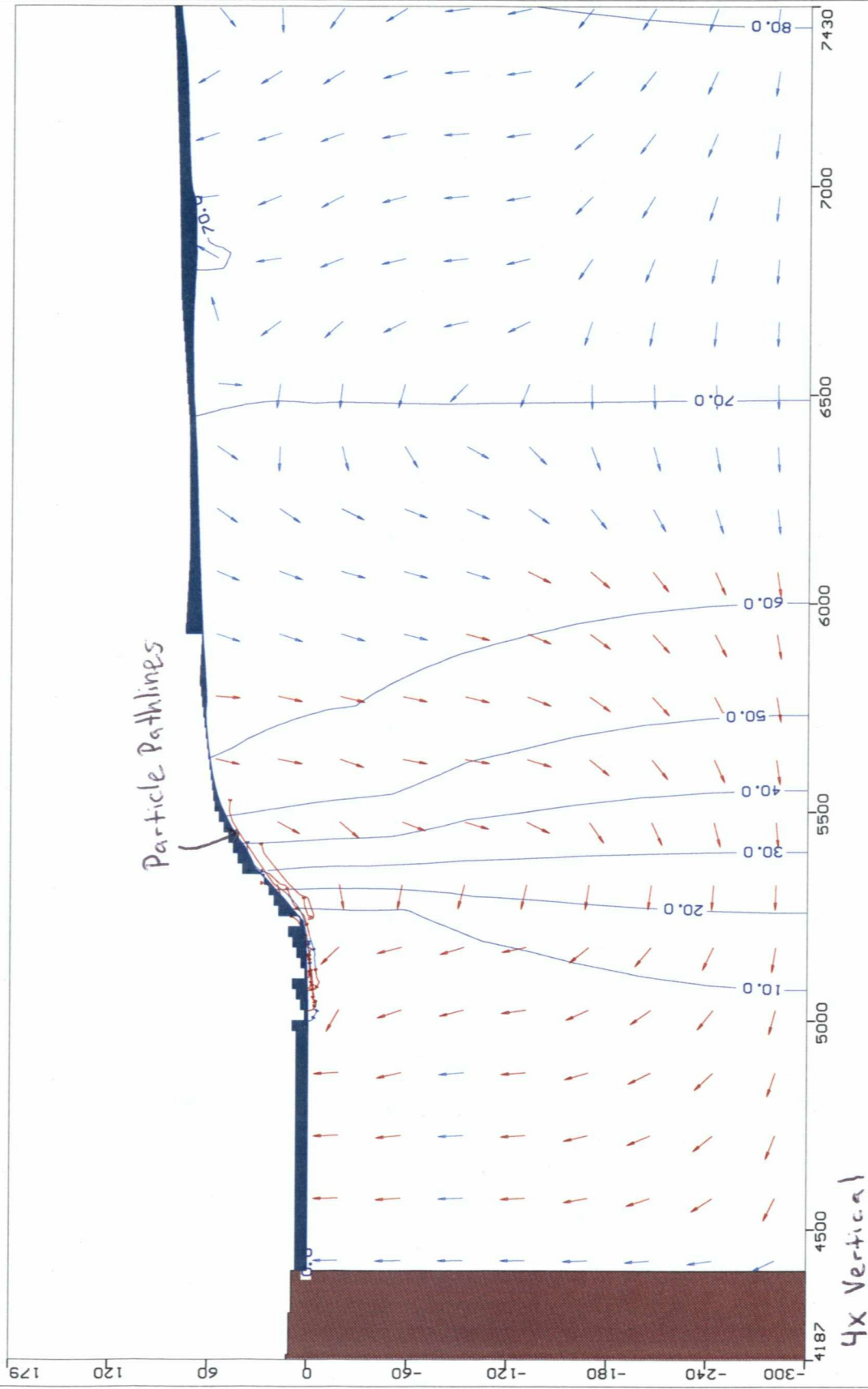
GROUNDWATER SIMULATION RESULTS

NW/SE Cross Section

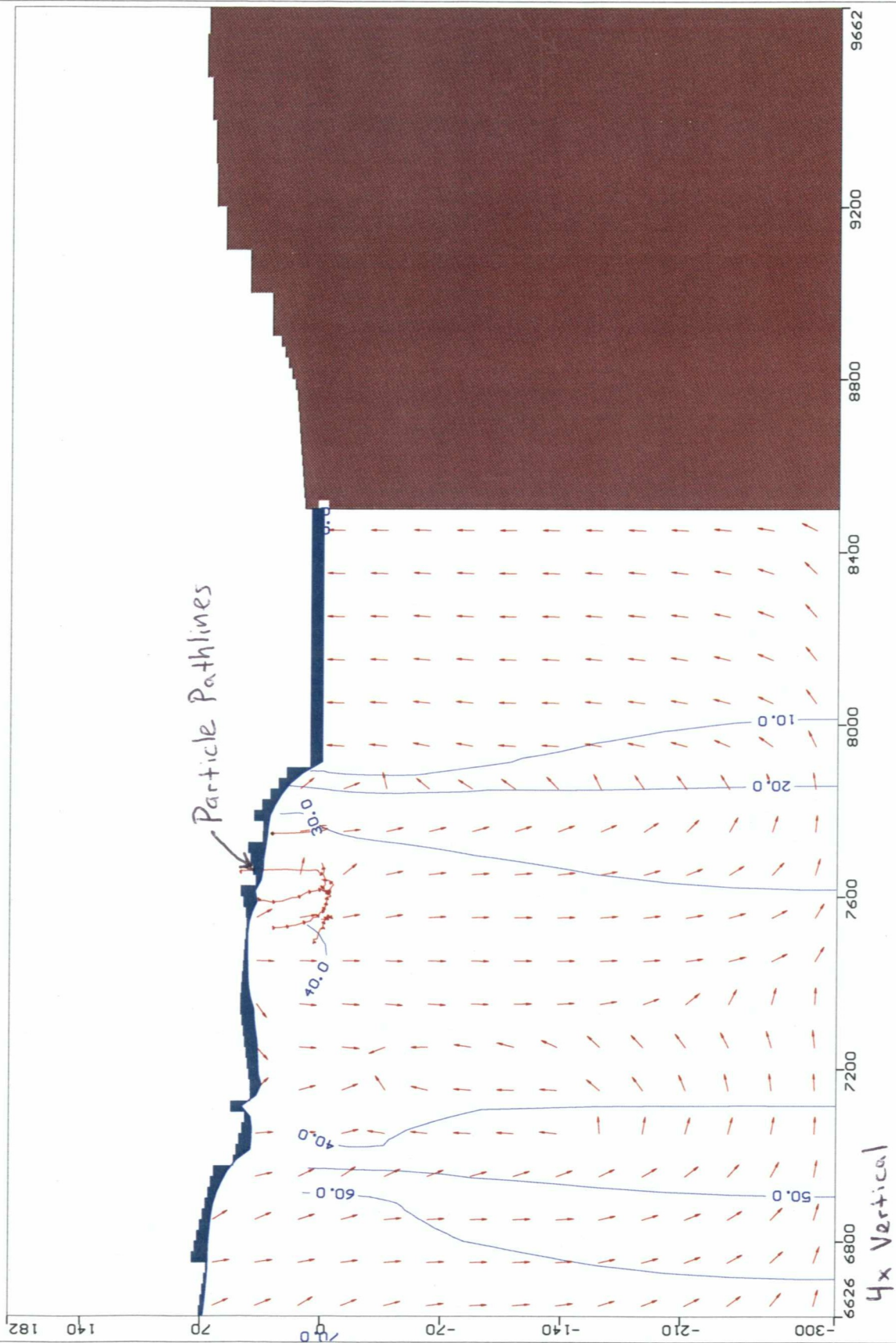
NE/SW
Cross
Section



Particle Pathlines from Landfill 1 - 365 Day Travel Time Markers - NE/SW Cross Section



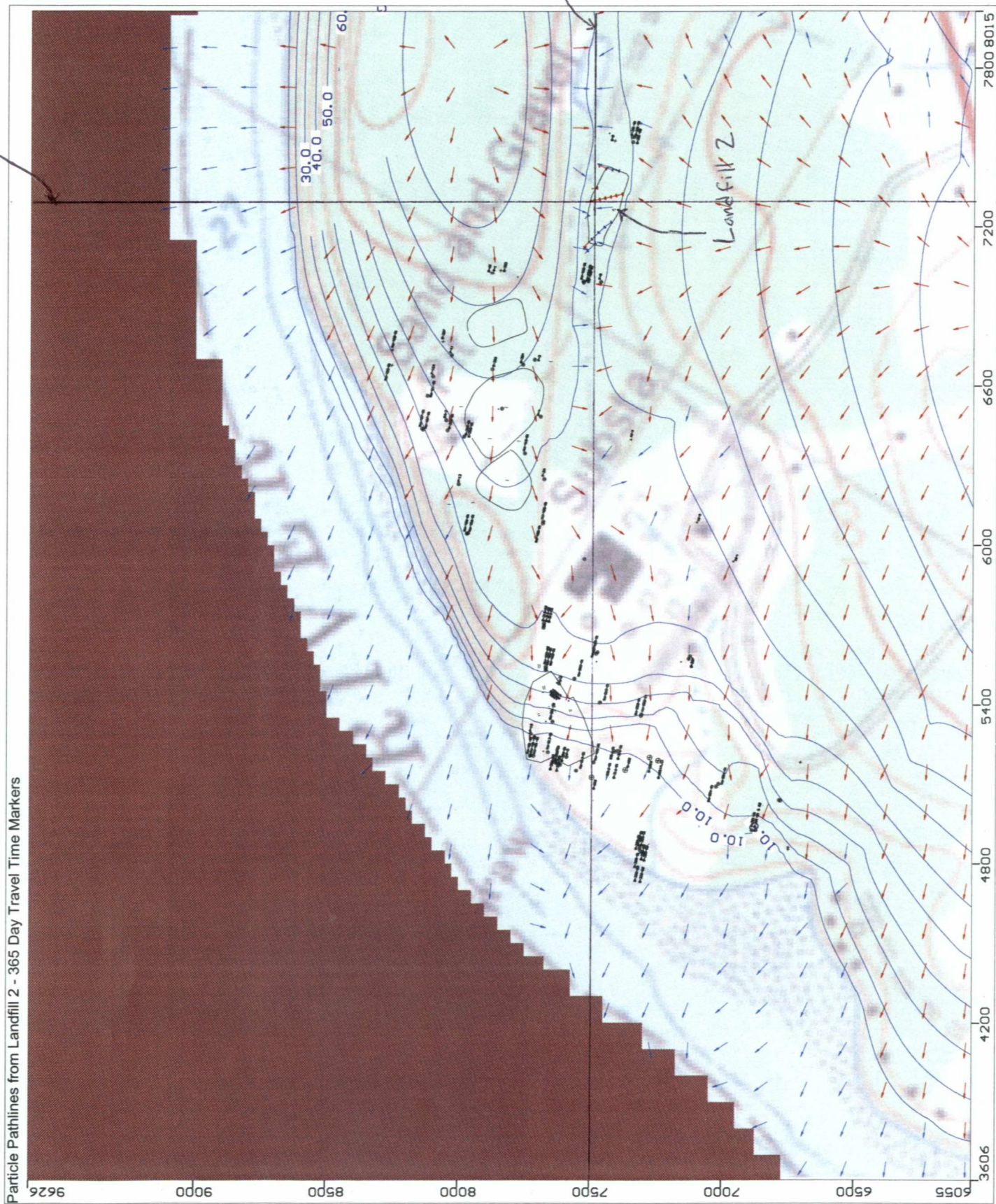
Particle Pathlines from Landfill 1 - 365 Day Travel Time Markers - NW/SE Cross Section



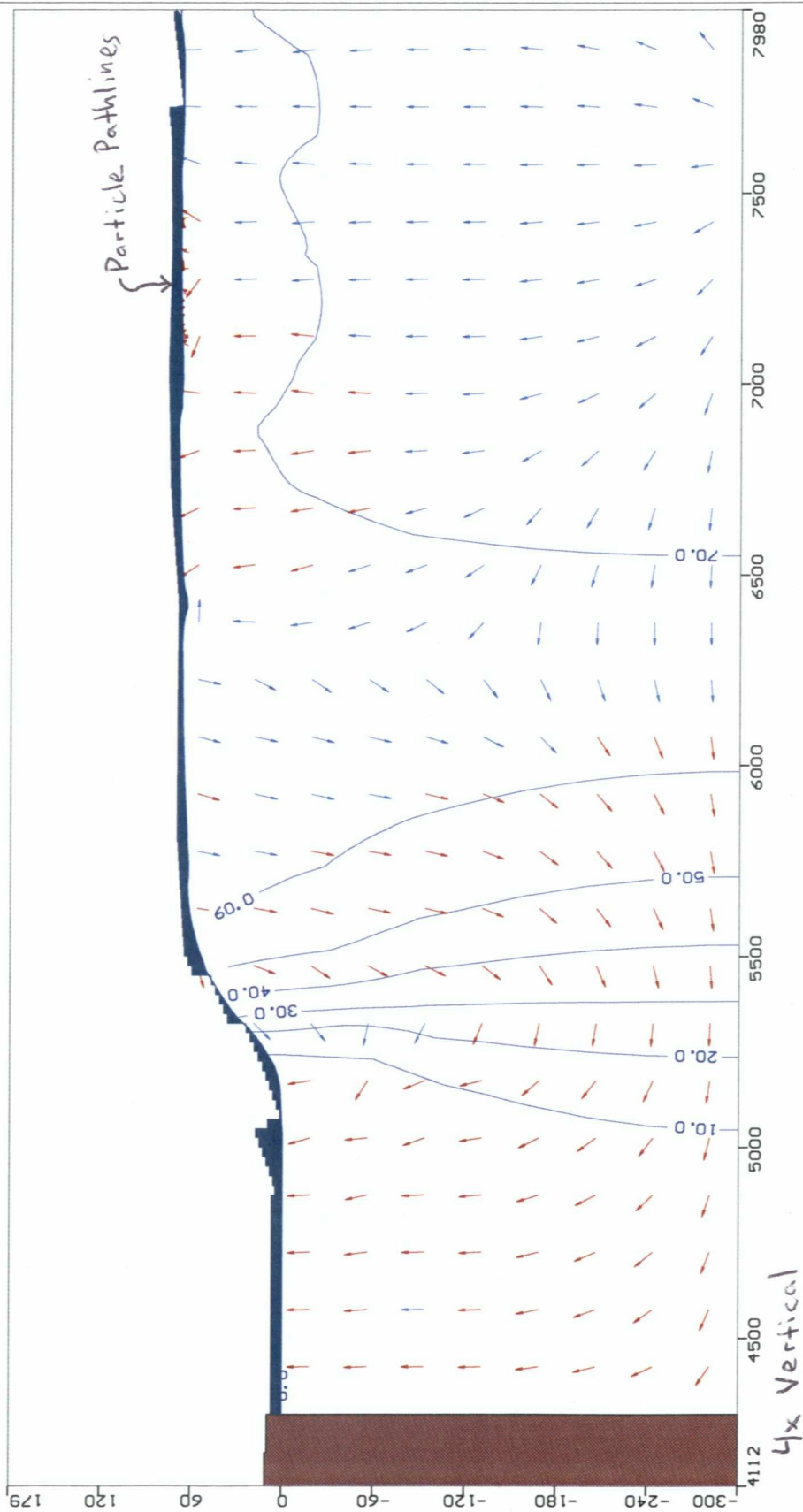
NW/SE Cross Section

NE/SW
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Section

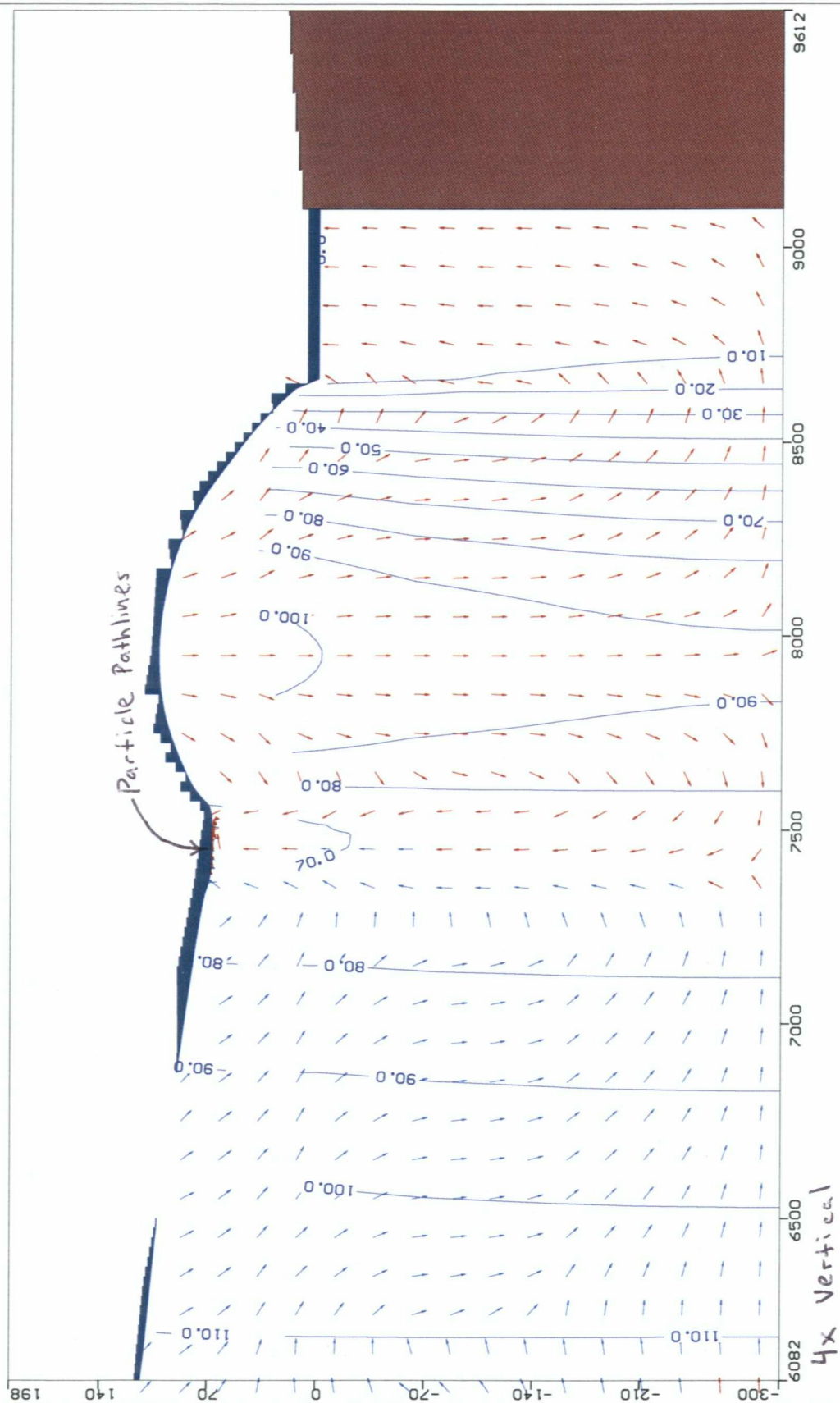
Particle Pathlines from Landfill 2 - 365 Day Travel Time Markers



Particle Pathlines from Landfill 2 - 365 Day Travel Time Markers - NE/SW Cross Section



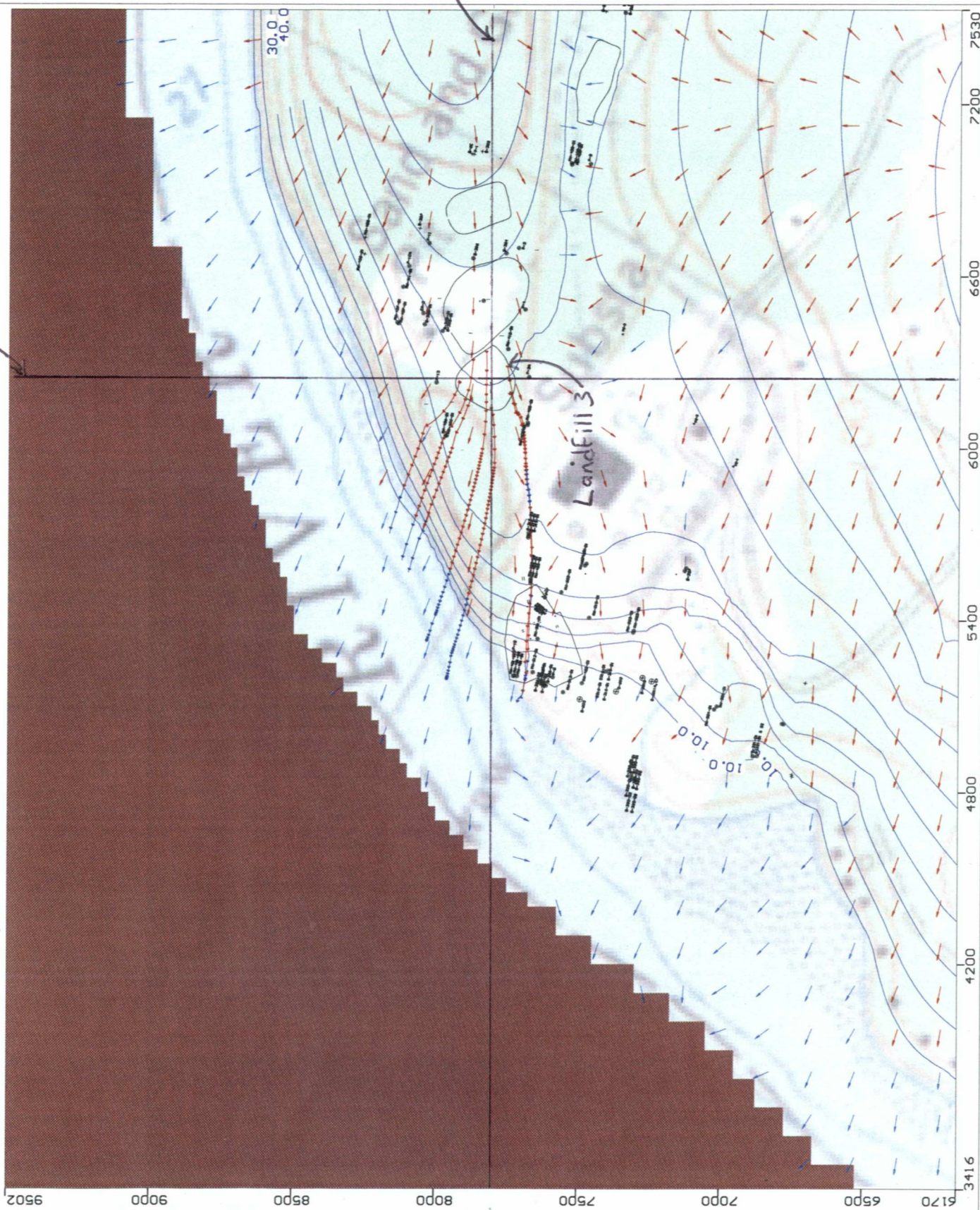
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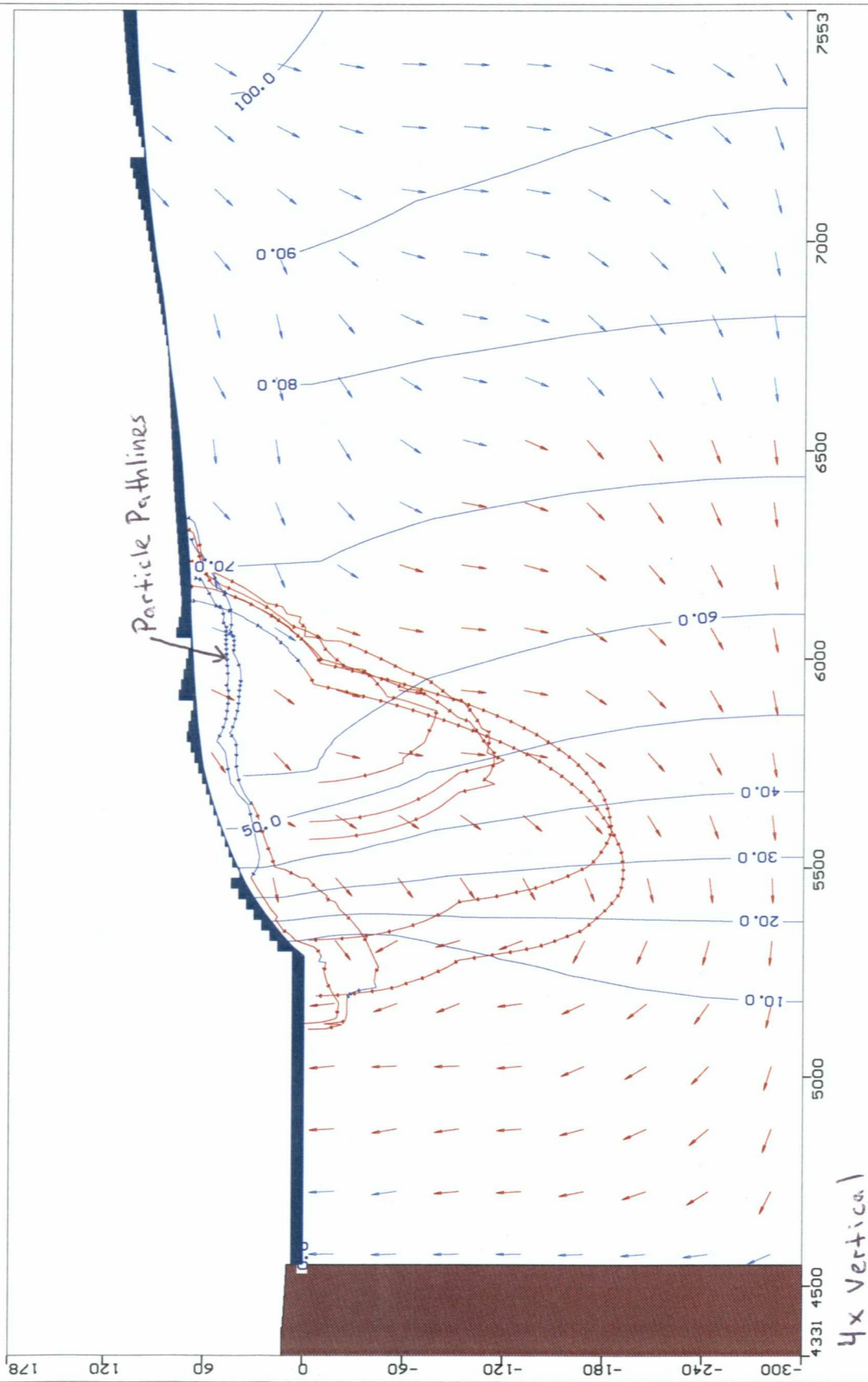
NW/SE Cross Section

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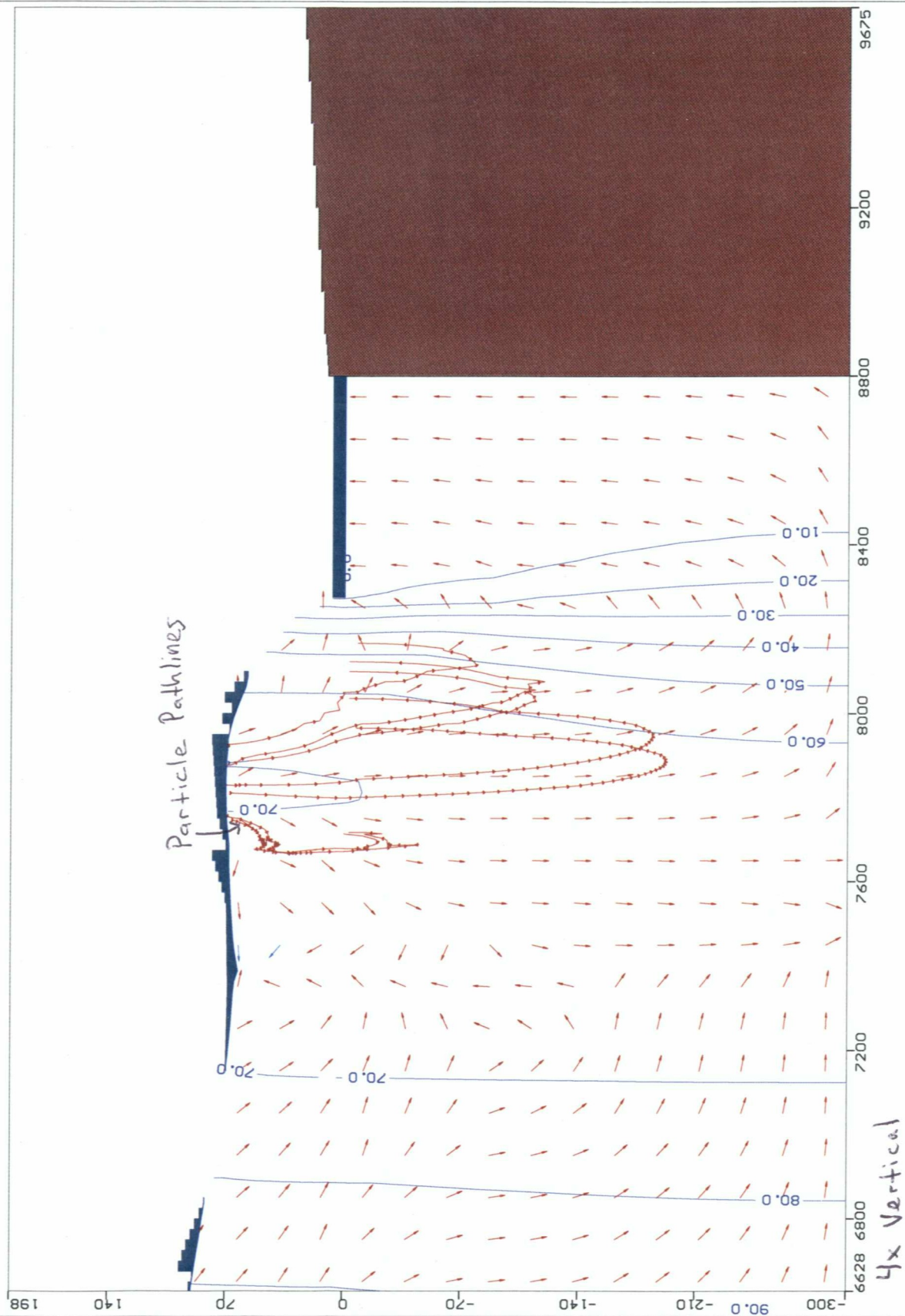
Particle Pathlines from Landfill 3 - 365 Day Travel Time Markers



Particle Pathlines from Landfill 3 - 365 Day Travel Time Markers - NE/SW Cross Section

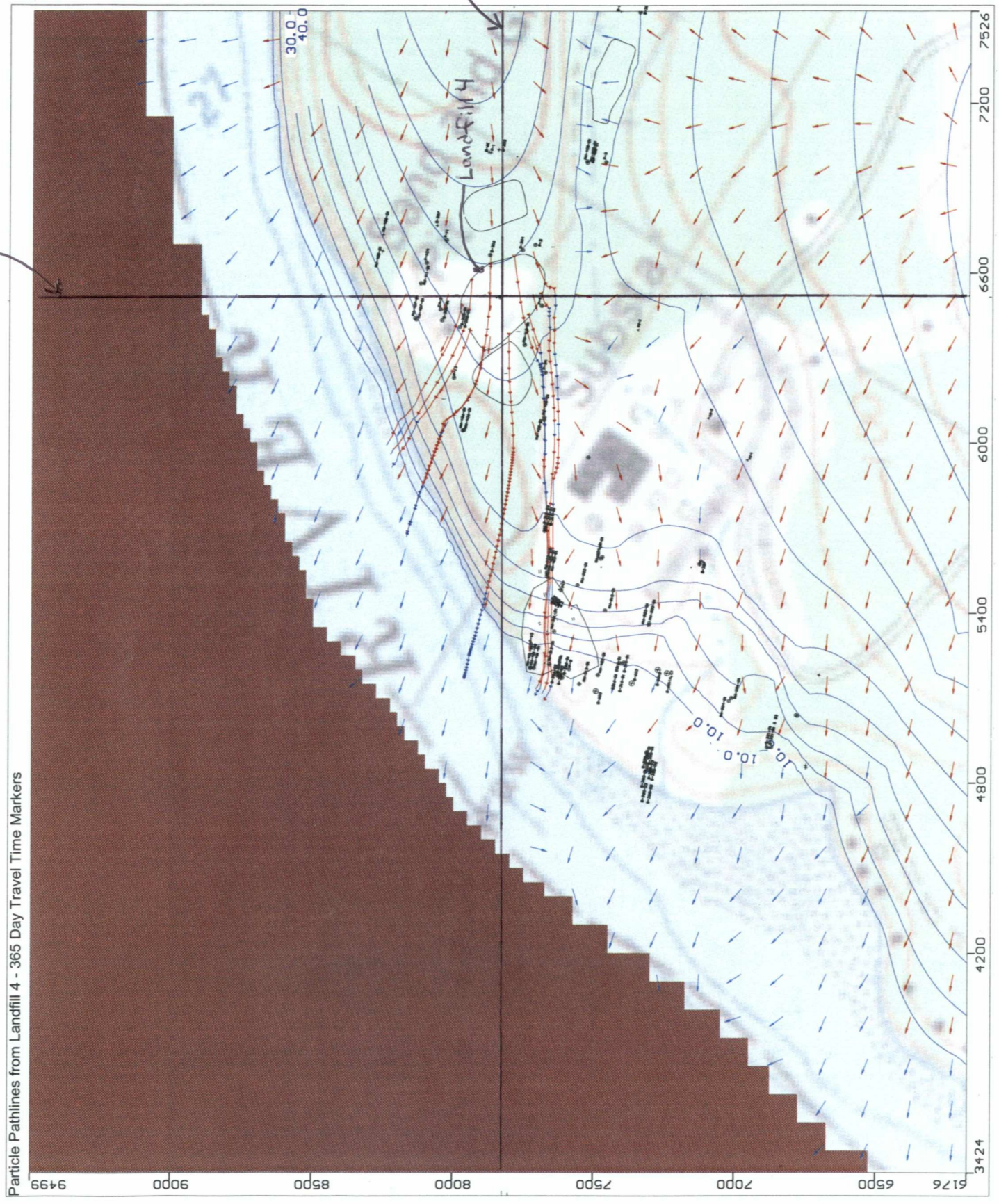


Particle Pathlines from Landfill 3 - 365 Day Travel Time Markers - NW/SE Cross Section

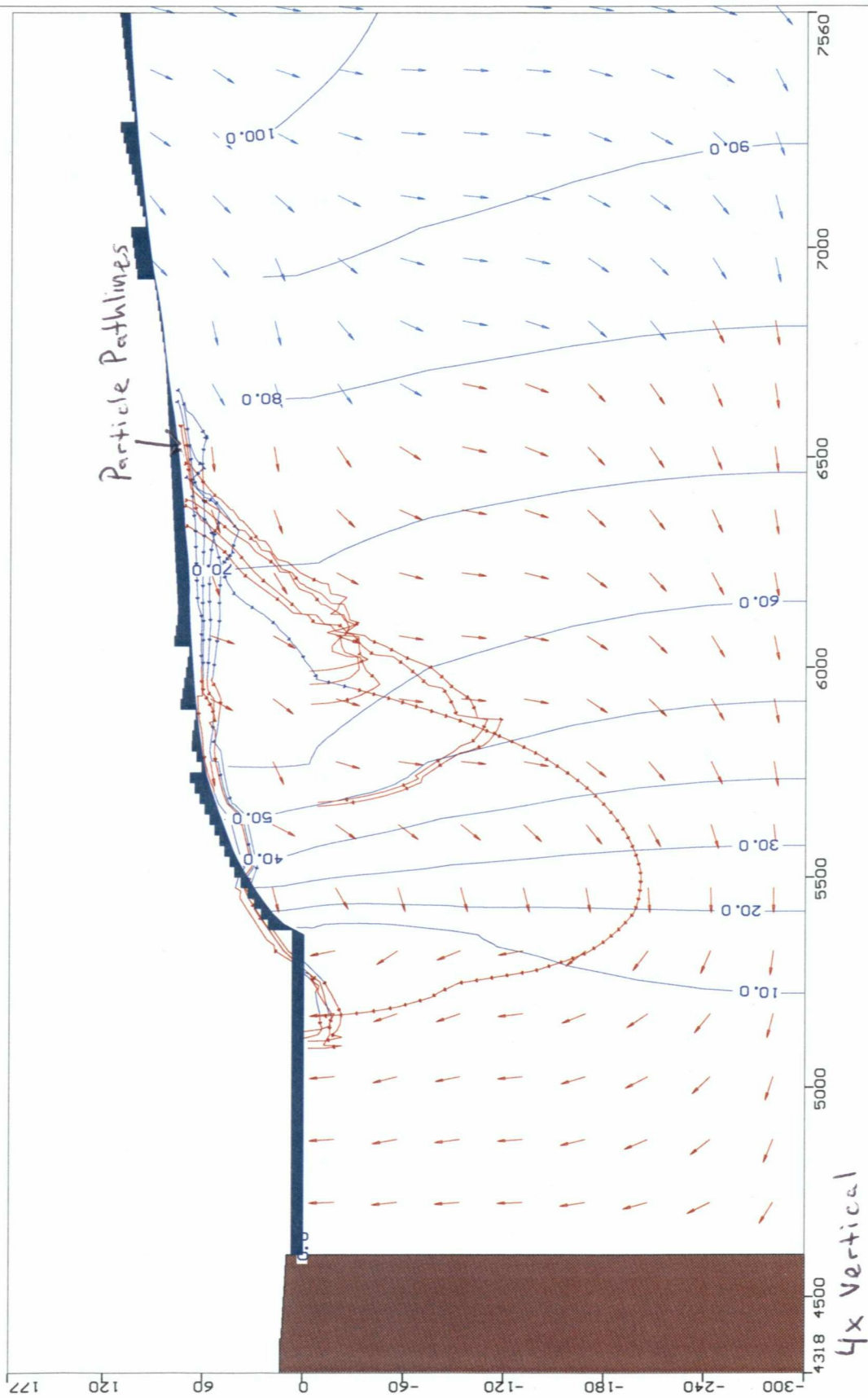


NW/SE Cross Section

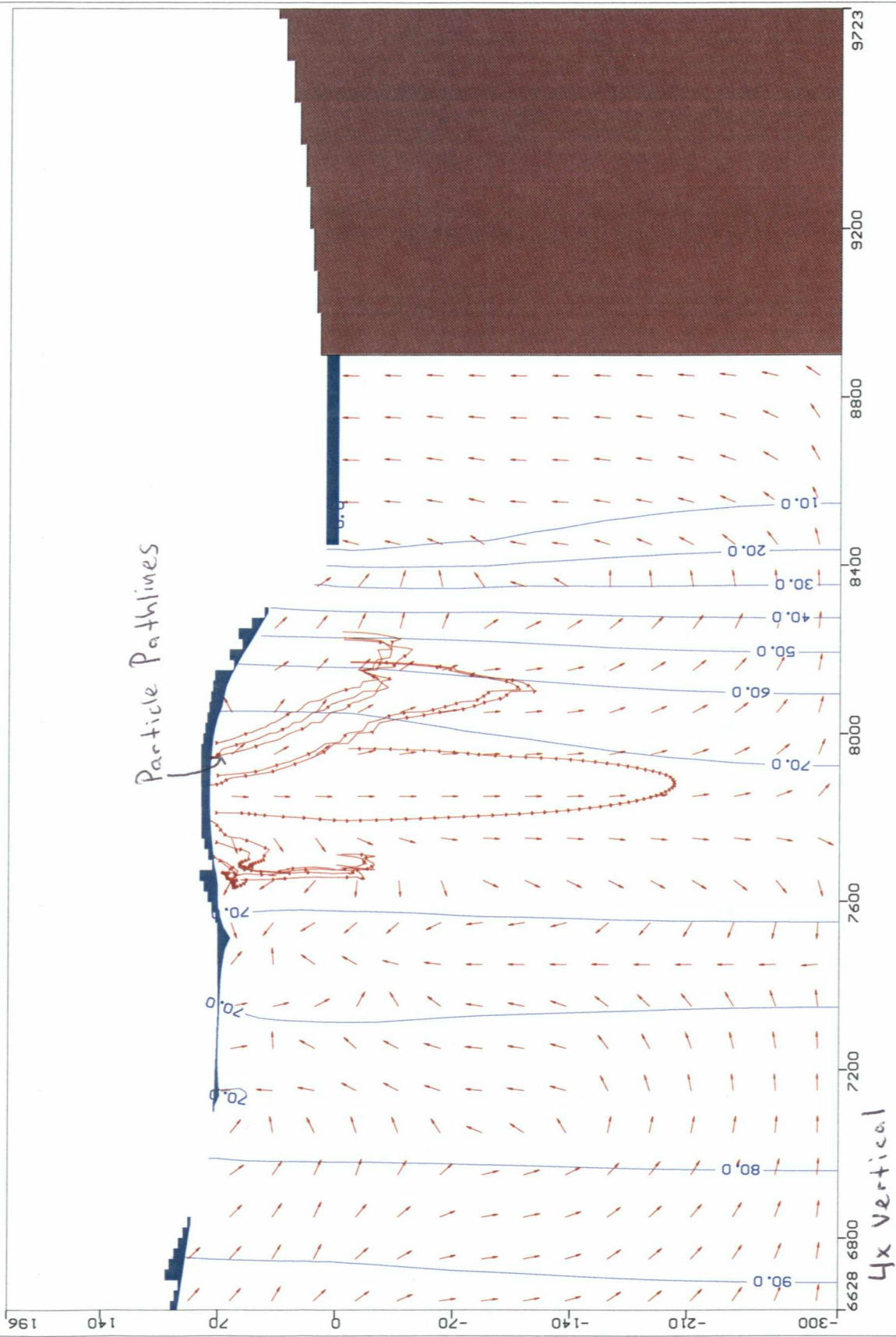
NE/SW Cross Section



Particle Pathlines from Landfill 4 - 365 Day Travel Time Markers - NE/SW Cross Section



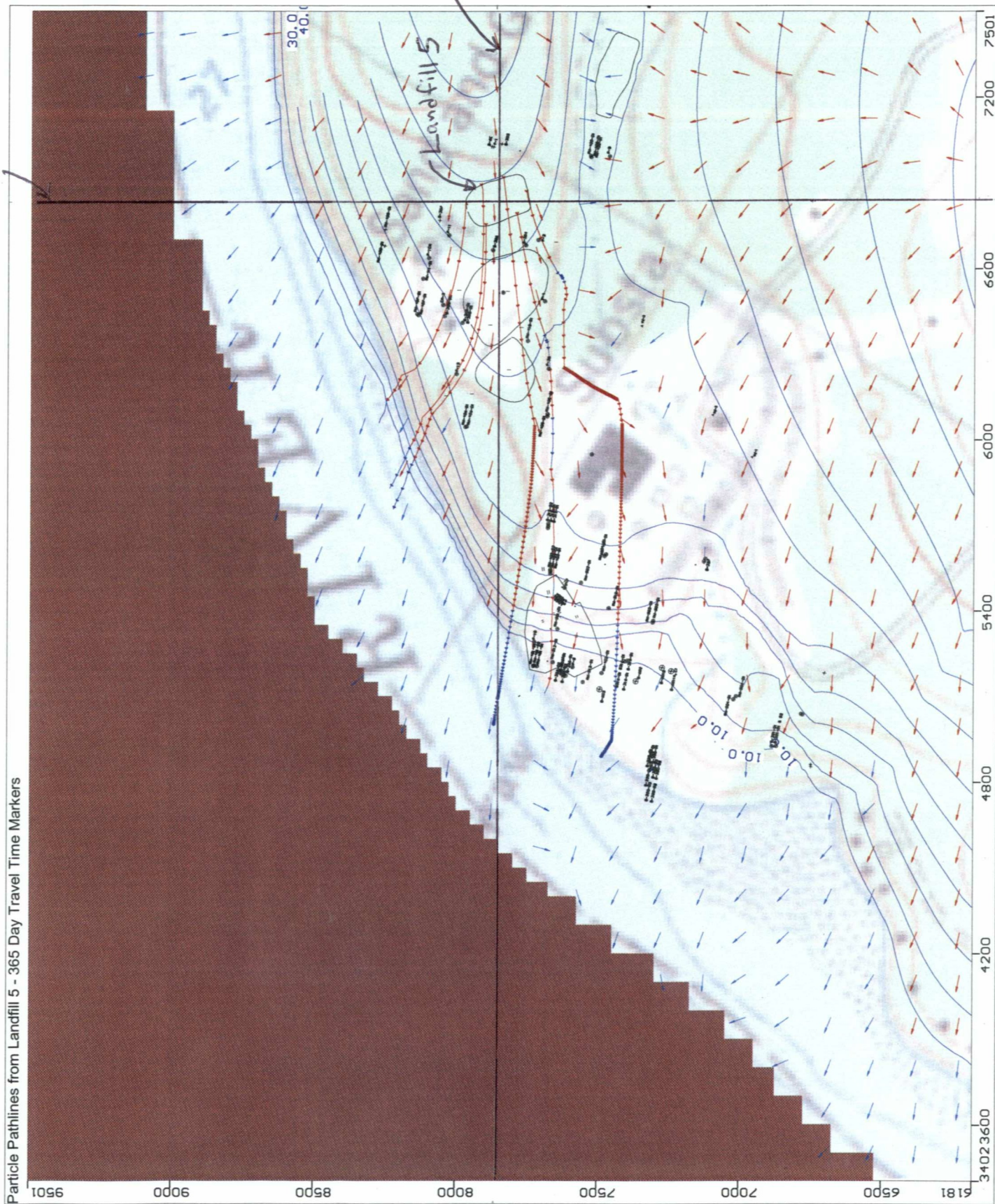
Particle Pathlines from Landfill 4 - 365 Day Travel Time Markers - NW/SE Cross Section



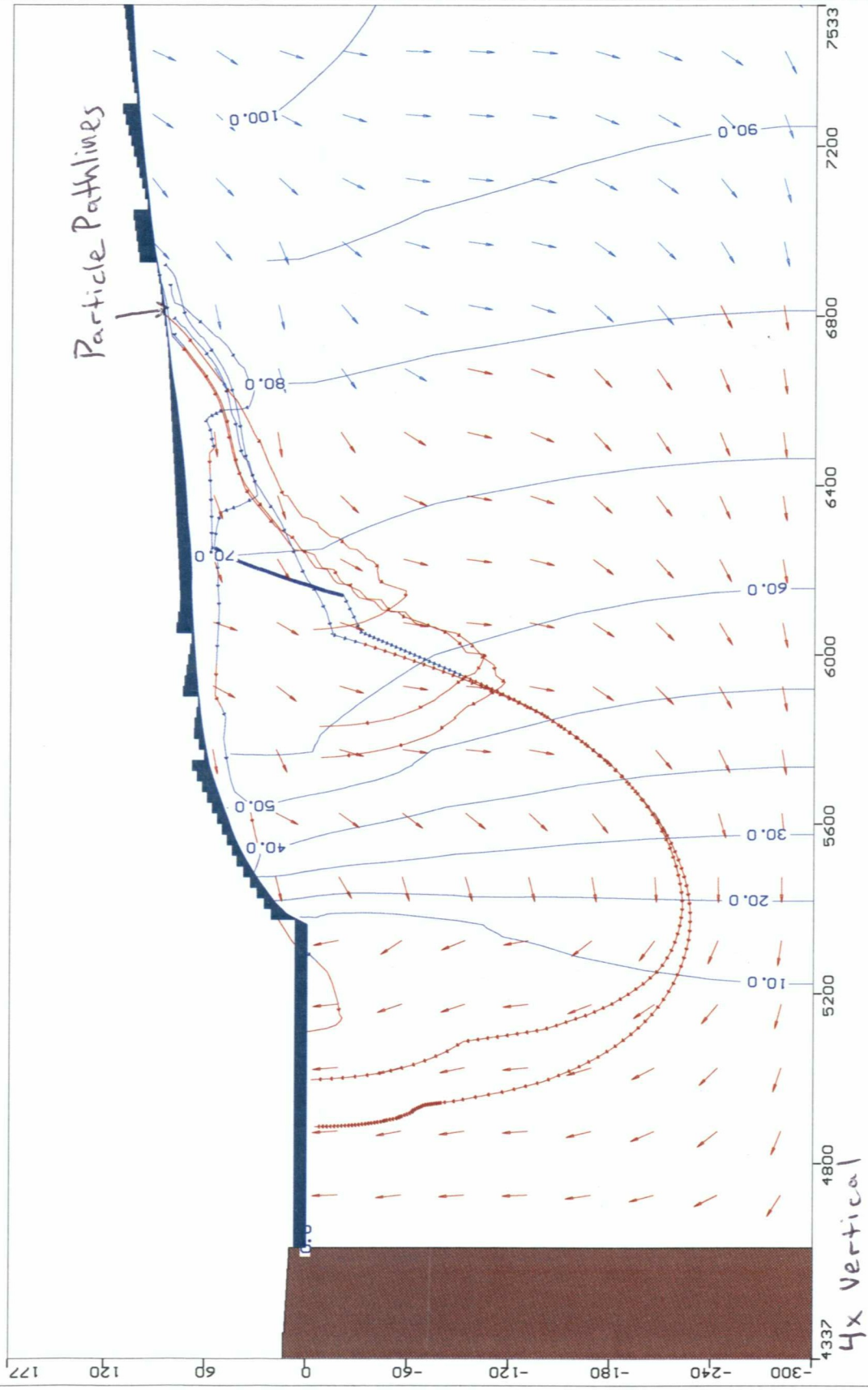
Nw/SE Cross Section

NE/SW
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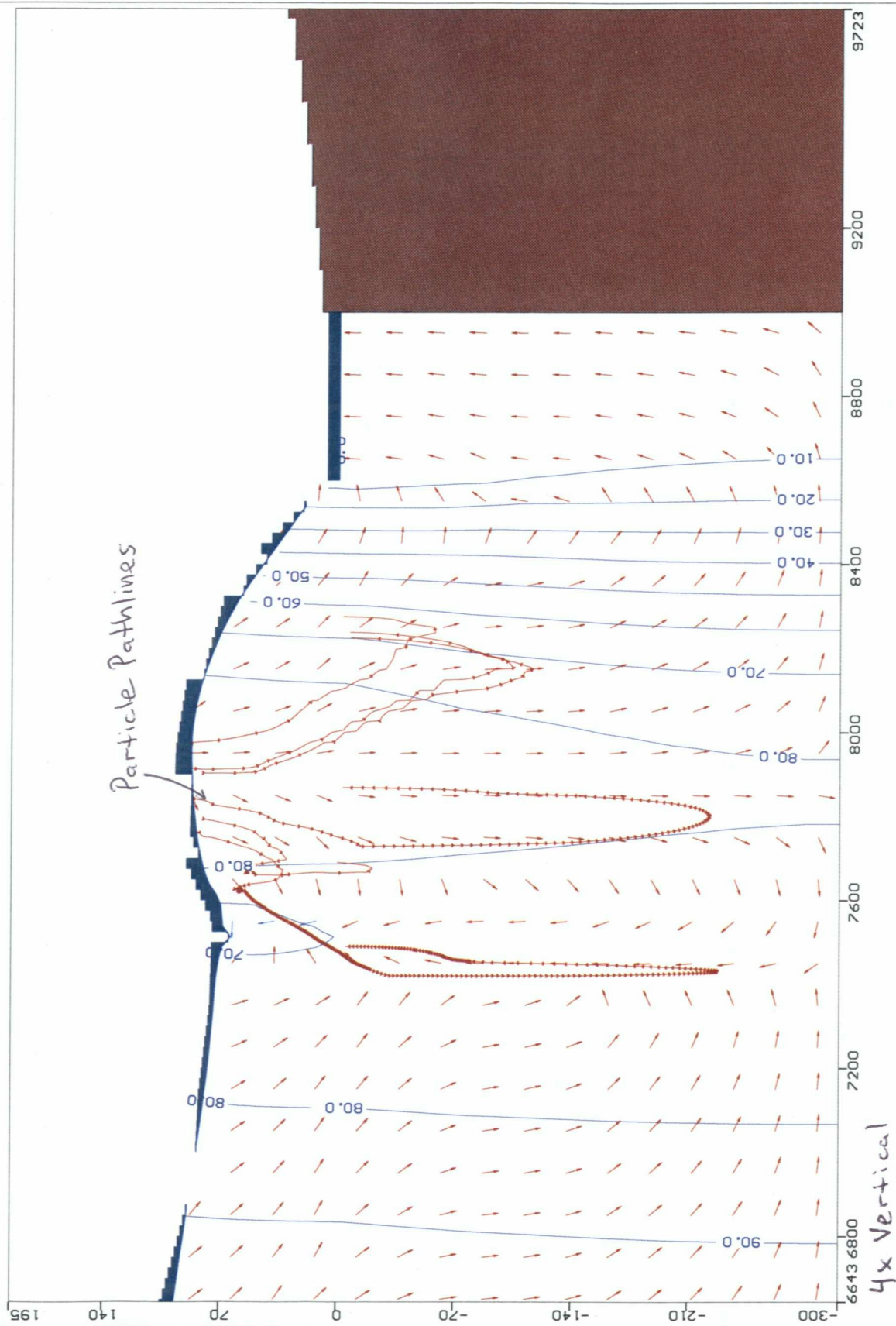
Particle Pathlines from Landfill 5 - 365 Day Travel Time Markers



Particle Pathlines from Landfill 5 - 365 Day Travel Time Markers - NE/SW Cross Section



Particle Pathlines from Landfill 5 - 365 Day Travel Time Markers - NW/SE Cross Section

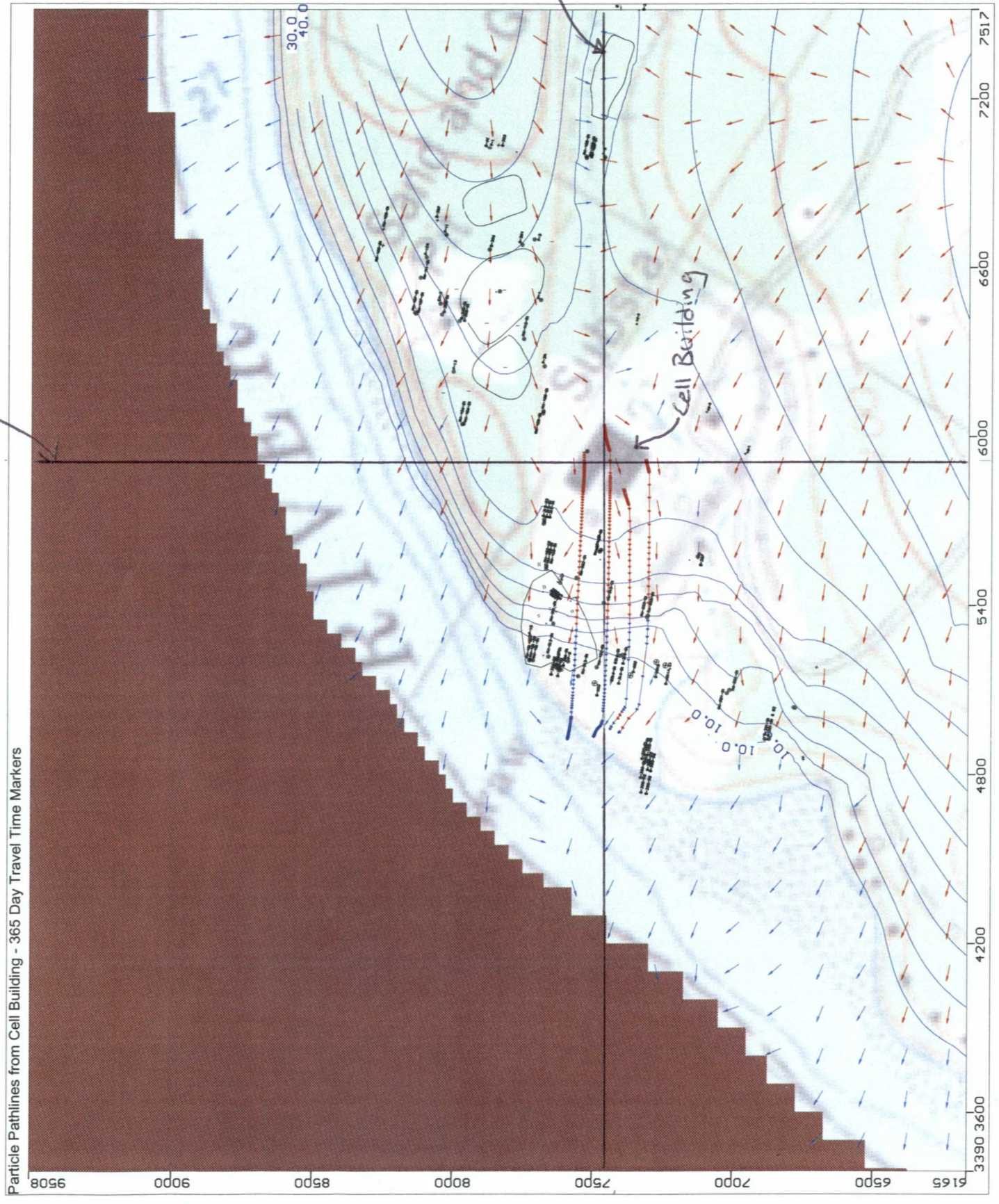


NW/SE Cross Section

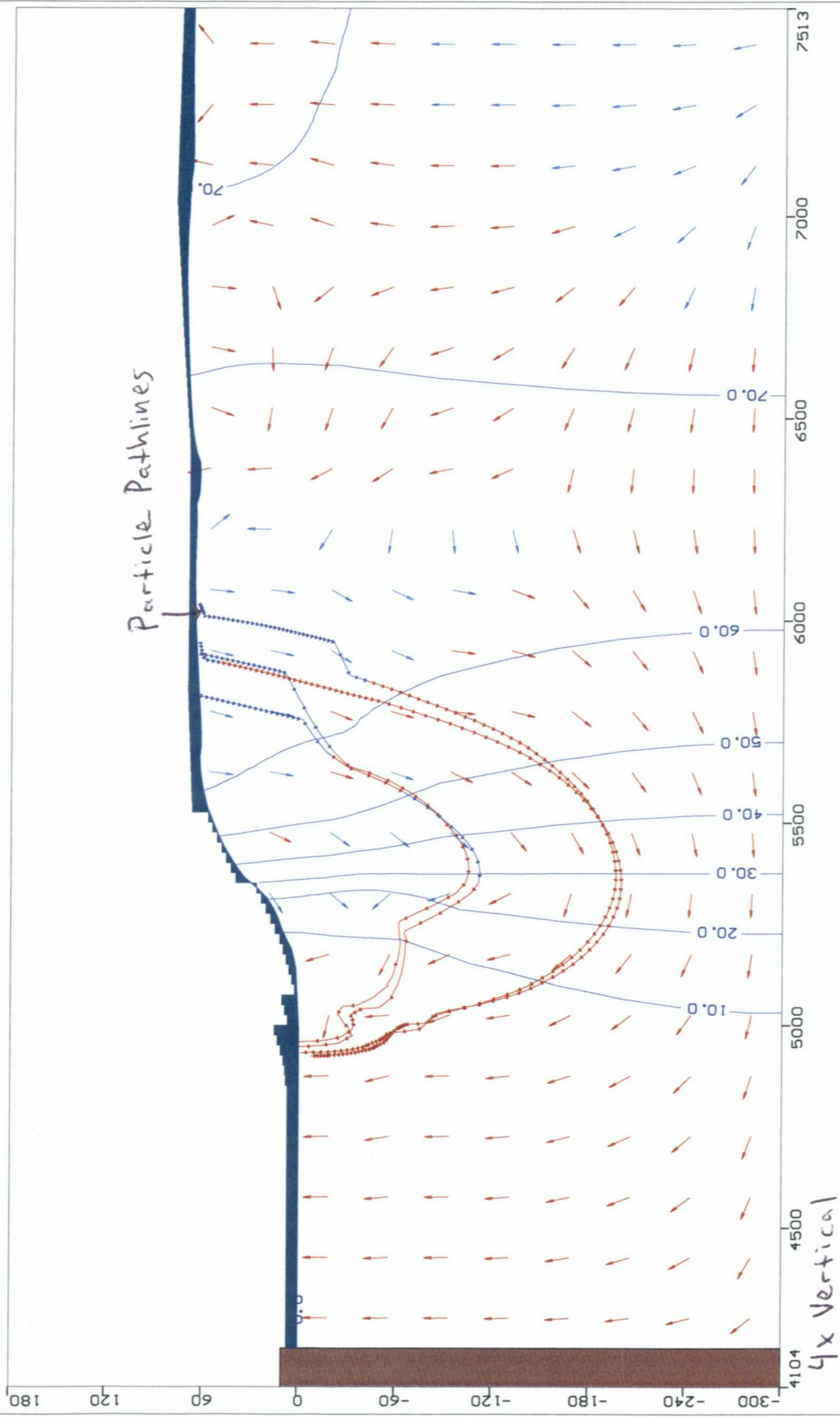
NE/SW
Cross
Section

Cell Building

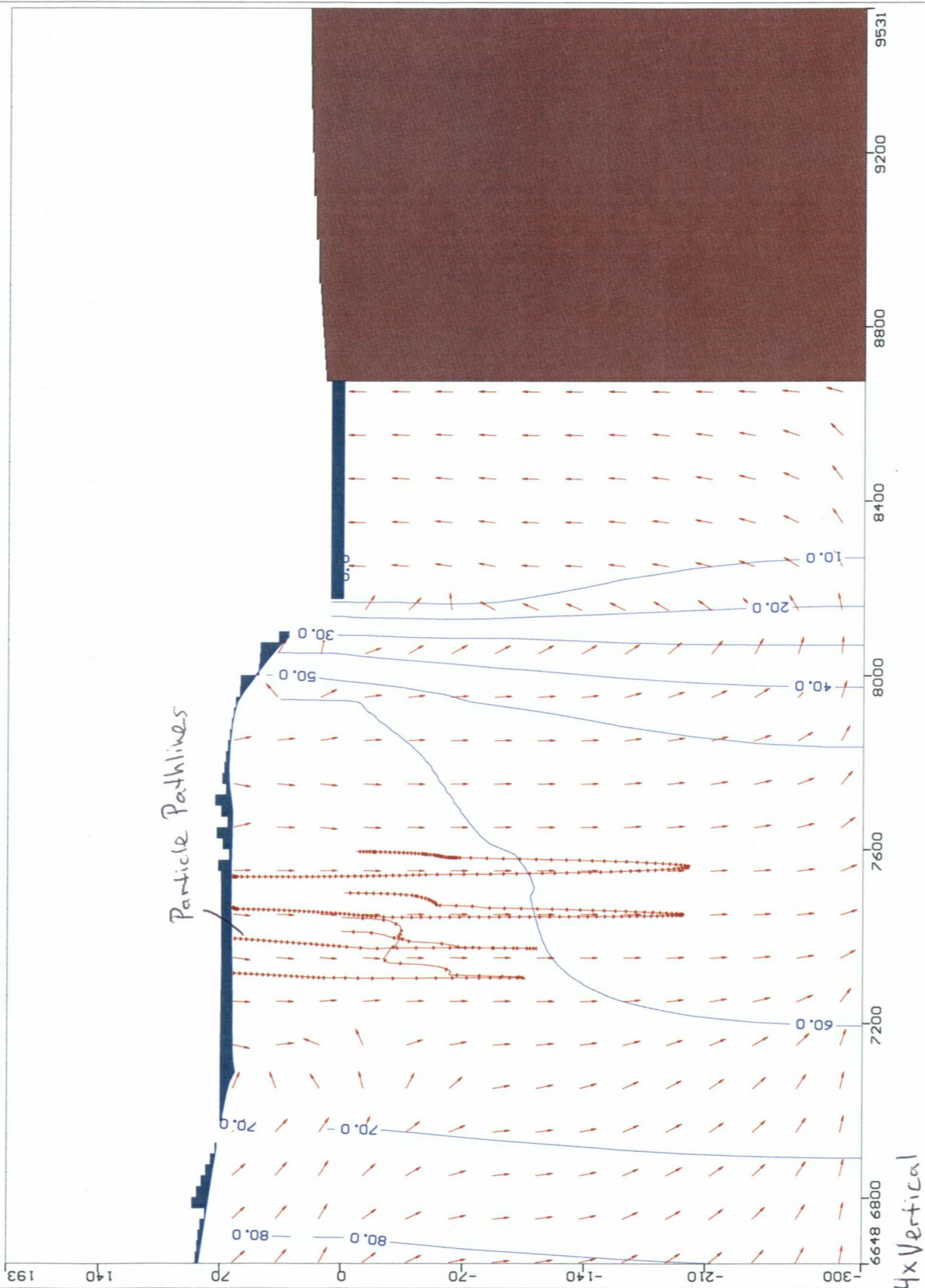
Particle Pathlines from Cell Building - 365 Day Travel Time Markers



Particle Pathlines from Cell Building - 365 Day Travel Time Markers - NE/SW Cross Section



Particle Pathlines from Cell Building - 365 Day Travel Time Markers - NW/SE Cross Section



EXHIBITS

M-0500

I. Geography of the site

A. Boundaries

River, Ferry road, PERC, Rt. 15 and rural residential

B. Topography

River is essentially sea level

Southern Cove is a tidal flat (tides about 11 feet)

NPDES outfall is just up-stream of Southern Cove

General slope of the land is toward the river

Bedrock Ridge (or landfill ridge) 80'-130' elevation

Northeast trending linear feature

Slopes steeply to the river on the northwest

Slopes toward the plant on the southeast

Truncated on the southwest by the river channel

Plant Area (or manufacturing area) - formerly part of a gravel pit

On a flat shelf southeast of the bedrock ridge

Elevation 60'-70' area of about twelve acres

Land slopes steeply to the river from the plant area

Ferry Road neighborhood

Low bluff overlooking the river

Southern half of southern cove

Elevation about 40', so it's lower than the plant area

C. Surface Drainage

Northern Stormwater Ditch

Starts in the underdrains of the Chlorate Building, flows in culverts and over pavement to the "paved sump", thence over sand and gravel to the southern cove near the location of the NPDES outfall.

Southerly Stream, source is the flooded quarry (gravel pit), flows past LF-2, through wetlands above plant, through a series of culverts, then through a wooded reach down the steep slope to the Southern Cove. Shows up on the 1900 USGS Bucksport 15' quad. Picks up runoff and ground water from the manufacturing area and Landfill 2.

II. Geology

A. the bedrock is metamorphosed sedimentary rocks that have been grouped with the Vassalboro Formation. Where it is fresh and unfractured it is nearly impermeable. Ground water flows in fractures and adsorption occurs on weathered surfaced.

B. Glacial Till is essentially unsorted rocky debris that is deposited directly from glacial ice. It contains clay, silt, sand and gravel, often including large

boulders. The till at the HoltraChem site tends to be very dense and has low permeability

- C. The site was a sand and gravel pit before it was developed for the chlor-alkali plant and there is still a lot of sand and gravel around. These sediments were deposited by glacial meltwater streams and tidal currents in an environment where the glacial was melting down in ocean water. There are even some pockets associated with the sand and gravel. Some of the gravels are very permeable. The plant even had some high-yield gravel pack wells in the gravel where they got cooling water for the plant. The layers of fine sand and silt have much lower permeability.
- D. There are several types of fill on the site. Some of it is just the native materials that were bulldozed flat to build the plant. Granular fill was used in construction of the plant buildings and as backfill around buried utilities. Then there are the landfills. They are mostly filled with brine purification sludge and wastewater treatment sludge. Much of the sludge contains wood flour, which was used for filtering the brine. It was routine to mix the sludge with sand to improve its compacted strength in the landfills.

III. Ground water

- A. The Penobscot River is a regional ground water discharge zone. One expects a slow steady underflow of presumably clean water from up-gradient of the site in the deeper bedrock and glacial till, from east to west, that comes up at the river.
- B. Local precipitation infiltrates and follows relatively short flow paths. It stays relatively shallow and discharges to the Northern Stormwater Ditch, the Southerly Stream, or directly to the river.
- C. Local ground water from the manufacturing area flows directly to the river. Most of it flows in the upper, more permeable layers of sand and gravel and fill, over the top of the less-permeable till. Abundant salt in the MA may have made ground water dense enough to invade deeper parts of the till.
- D. Where the till is thin or absent the ground water from the plant has direct access to the bedrock aquifer. Two homes on Ferry Road have very salty well water. The geochemistry of their well water makes salt water intrusion from the river unlikely, and all the monitoring wells between Ferry Road and the manufacturing area are salty. It is likely that the salt in their wells came from HoltraChem, but CDM and Malinckrodt don't agree.
- E. Much of the ground water that originates on the bedrock ridge flows to the river by way of the manufacturing area. Some of the ground water that originates on the ridge flows north, directly to the river.

IV. Contaminants

- A. Intro – HoltraChem was a large manufacturing facility. It was heavy industry. Lots of industrial activities took place on the site that gave rise to many different contaminants. There are five ground water contaminants that are really worth discussing, and only two of these are potent toxicants. The

minor contaminants will be mitigated by the remediation of the major contaminants.

- B. Salt was the raw material for the process. They performed electrolysis on saturated brines to produce sodium and chlorine based chemicals. From 1967 until 2000 they stored a large uncovered pile of solar salt at the edge of the manufacturing area. Brine spills also caused salt contamination of ground water. Handling and landfilling of the brine purification sludges were salt sources too. The salt makes the ground water un-potable and it also helps to highlight ground water flow directions.
- C. Chloropicrin is an soil fumigant that is often referred to as a pesticide, but chemically it is more of a volatile organic compound. It is trichloronitromethane. It's a slightly soluble DNAPL (1600 ppm). Spills occurred at the western edge of the Manufacturing Area from leaking underground product piping and from a surface spill that ran down the Northern Drainage ditch. Concentrations up to the range of 50 ppm in wells directly down slope from the spills. One well on Landfill Ridge shows a stray hit now and then, so it looks like they may have landfill some chloropicrin-contaminated waste in LF3 or LF4.
- D. Caustic Soda was one of the major products of the plant. At low concentrations it is not really a problem for ground water, but in the area where they stored it and loaded it onto trucks and rail cars they spilled enough to make the ground water very basic. The pH in that area is generally over 11, and it was causing high pH in the stream. The existing ground water collection and treatment system is preventing caustic contamination of the stream.
- E. Carbon Tetrachloride was used to treat carbon anodes to prevent them from combusting. Waste carbon tetrachloride was disposed of in the landfills and some may have been spilled in the manufacturing area. It degrades to chloroform, and if a well had carbon tet, is usually has a sub-equal amount of chloroform.
- F. Mercury was used as the cathode in the electrolysis process that separated the sodium from the chlorine. The process brine was directly in contact with the mercury and it became contaminated with dissolved mercury. As part of the process the brine was purged of the contaminants in the salt that would build up in the brine as sodium and chloride were removed. This created the brine purification sludge, made up mostly of calcium and magnesium sulfate and bicarbonate, which was also contaminated with mercury. Contamination of environmental media could result from 1) brine spillage, 2) leaching or dispersion of sludges or 3) direct spilling of mercury.

V. Source areas

A. Chloropicrin

Location, concentrations, fate (discharge to river, volatilization and photodegradation)

B. Mercury in plant area

Brine spillage, leaching of sludge and mercury spillage

Highest mercury in GW where it flows toward LF 1 area.
Concentrations much lower since plant closed – probably repeated brine spills.

C. Landfill 1 area

Lined process lagoon the major source.

Water from the plant area and Landfill ridge also contribute

Waste in landfill 1 may not be a major source, it appears to be largely above the water table and is covered, but the up-gradient signal is so strong it swamps the input from the waste.

Review concentrations in wells.

D. Landfill 2

Waste is in the ground water, cover is just clay, probably glacial till.

Special investigation with micro-wells.

Salt elevated, so there is a plume, but no dissolved mercury hits above the PMPS.

E. Landfill Ridge

Landfill 5 is a RCRA waste unit. Has been extensively monitored since 1983. Occasional hits of dissolved mercury right at the detection limit, but none above the PMPS.

Backside wells – elevated salt, carbon tetrachloride and chloroform and rare hits of dissolved mercury near the detection limit. The wells are in the leachate plume, but there isn't much mercury in the water. It also means that the mercury-contaminated soils in the former gravel pit are not a major source of dissolved mercury.

Plant side wells – mercury concentrations exceeding PMPS regularly. Ground water appears to flow toward the plant and eventually to Landfill 1 where the ground water collection is proposed.. Also contain Carbon Tetrachloride.

M-0501

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF REMEDIATION AND WASTE MANAGEMENT

MEMORANDUM

TO: Stacy A. Ladner ES IV
Division of Hazardous Waste Facilities Regulation

FROM: John E. Beane, Senior Geologist
Division of Technical Services

DATE: December 5, 2001

SUBJECT: Review of 2001 revisions to 1998 Site Investigation Report, HoltraChem Manufacturing Site, Orrington, ME, by Camp Dresser and McKee, Inc.

I have read through the documents in the revisions packet and have a few comments. Most of the revisions don't pertain directly to hydrogeology, geology or physical science in general, so my comments are not extensive.

On page 10-18 CDM implies that they may intend to use the Mn concentration in the Norlens Water Treatment well as an up-gradient background concentration. The concentrations of conventional inorganic analytes in the Norlens well are all elevated. The water is quite salty and rich in iron. The well may, in fact, be polluted, and as such, it would not be an appropriate background sample point. The well is located right on the corner of the HoltraChem access road and Route 15, a location where some amount of ground water pollution might not be unexpected. The highway gets salted every winter, and the trucks conveying salt to the HoltraChem plant turned that corner every day for thirty-three years. I recommend that they choose monitoring wells in clusters B-301 and B-303 for use as background and up-gradient ground water compositions. Those locations are more directly up-gradient from the plant and the landfills, and are away from sources of anthropogenic contamination.

Page 10-20. They are advocating an ambient water quality criterion and a PMPS of 0.91 ug/l for the southerly stream and northern ditch. If even a fraction of that concentration occurred for very an extended period of time the mercury flux to the Penobscot River by way of surface water would be substantial. If they are allowed to have such a large ceiling, perhaps there should be a total annual flux number as well.

They have not specified how, where or when specific conductivity would be measured to determine background for the southerly stream. Should we agree on a number rather than some unspecified background?

Page 9-28. The Piscataquis River does not flow through Falmouth. I suspect that they mean the Piscataqua River.

In our recent meeting to review together our comments you asked me to determine what changes had been made in Table 9-6 between the 1998 and the 2001 iteration. The changes are listed below.

Subsurface soils – They dropped nine Acheron samples from consideration. They added 119 plant area samples and five samples from outside the plant area.

They dropped subsurface soils from consideration.

They dropped ground water from consideration.

Penobscot River Surface Water – They dropped ten Acheron samples from consideration and added fourteen new samples.

Penobscot River Sediments – They added 156 sediment samples analyzed for mercury.

Biota – They made no changes.

They appear to have dropped from Table 9-6 all samples collected by others and focussed only on those samples collected by CDM. They have also dropped media (subsurface soils and ground water) that would be unlikely to have direct impact on ecological receptor.

Results of the Investigation of Chloropicrin in Soils at the HoltraChem Manufacturing Company RCRA Corrective Action Site, Orrington, Maine.

CDM implemented a geoprobe investigation of soils in the areas of known chloropicrin discharges to determine whether 1) shallow soil contamination existed that might pose a threat to site workers involved in excavation or 2) soil sources existed that might be legitimate targets for removal actions. Some chloropicrin-contaminated soils were found, but none satisfied the above criteria.

In one possible contaminant transport scenario the chloropicrin could have traveled on the steep till surface from the location of the spills down to the area of B-316 and MW-402 at the base of the slope as free product. The product would not have pooled at the top of the slope, but would have flowed down to where the till slope flattened. It is a dense liquid (specific gravity ~ 1.66) so it would continue to flow, regardless of the location of the water table, given sufficient product volume. The investigation implemented by CDM was not designed to discover a deep pool of chloropicrin at the base of the slope. Deep contamination below the water table does not pose a risk to workers excavating on site and it is not a target for a removal action, but it could sustain

ground water contamination for a considerable period of time. The proposed ground water extraction and treatment system for the Landfill Area 1 plume will capture any dissolved chloropicrin resulting from this mechanism and it will allow evaluation of the persistence of the residual contamination.

Landfill 2 Investigation Results

The additional investigation at Landfill 2 was intended to determine whether the water table was within the waste at least seasonally, and whether leachate was contaminating ground water. The results showed that the water table is in the waste even during the low water season, that ground water flows through the waste toward the southerly Stream, and that salt from the waste can be detected in the ground water down gradient of the landfill. Dissolved mercury was not detected in ground water. It appears that ground water is leaching the waste, but that the mercury is probably bound tightly to the sludge and is not migrating to the southerly stream at an appreciable rate.

Follow-up to this investigation should include measurement of water levels, specific conductance and dissolved mercury in other seasons when more of the waste is saturated.

Contaminants of Concern

Of the contaminants that were detected in ground water, CDM has chosen not to retain several as contaminants of concern because they were not detected in a large number of monitoring wells. 1,1-dichloroethane, bromodichloromethane, carbon disulfide, chlorobenzene, bromomethane, chloromethane (methyl chloride), dibromochloromethane and methylene chloride were dropped from the contaminants of concern list because they were detected in less than five per cent of the samples analyzed. Frequency of detection is not a valid criterion for choosing contaminants of concern. Only those detected contaminants where laboratory error can be demonstrated or where subsequent sampling fails to confirm the presence of the contaminant may be dropped from the list of contaminants of concern. Analytes that can be shown to be naturally occurring and within the range of background concentrations are not contaminants, and should not be listed as contaminants of concern. Using these criteria, I suggest the following list of contaminants of concern.

M-0502

Stahler, Deborah

From: Ladner, Stacy A
Sent: Thursday, July 15, 2004 12:05 PM
To: Beane, John E; Stahler, Deborah; Lavallee, Fred C
Subject: HOLTRACHEM MANUFACTURING COMPANY SITE

Attachments: holtachem corrective measure study.doc



holtachem
corrective measure s.

Here is the revised Basis Statement. If you could please look at the entire document, I would appreciate it. A couple of things to pay particular attention to:

- footnote for Deb's quote needed, comment #28
- landfill ridge response, should we mention the water going out the backside to the Penobscot River, comment #16
- landfill #1 and landfill ridge area, do we need to evaluate erosion potential? comment #16

Items for me to do:

- response needed from Maine Cancer Registry, comment #7
- review Court Case description with John Rudd, Section IV
- update groundwater collection of manufacturing area before finalizing, Section V
- update Index after changes, page 4

HOLTRACHEM MANUFACTURING COMPANY SITE
ORRINGTON, MAINE

CORRECTIVE MEASURE STUDY

BASIS STATEMENT AND RESPONSE TO COMMENT

June 18, 2004

Issued by Maine Department of Environmental Protection and US Environmental Protection Agency

I. Introduction

The HoltraChem Manufacturing Company (HoltraChem) site in Orrington, Maine is located on a 235-acre property on the banks of the Penobscot River. Approximately 50 acres are developed and include the manufacturing facility, five landfills, a surface impoundment, two waste piles and six leachfields. The immediate plant area is approximately 12 acres. The facility opened in 1967 and manufactured chlorine, caustic soda (sodium hydroxide), and chlorine bleach (sodium hypochlorite) used primarily by the region's paper mills. The plant also manufactured hydrochloric acid and the pesticide chlorpicrin. The plant closed in September, 2000.

Deleted: a scrap metal area

The plant used a chlor-alkali process to separate sodium and chlorine from salt water. In this process, elemental mercury was used as a cathode to collect the sodium from the water. The chlor-alkali process is an older technology and has been replaced by mercury-free production techniques at newer plants and some converted older plants. When it stopped operations in 2000, HoltraChem was one of 13 chlor-alkali plants left in the county. There are currently 9 mercury chlor-alkali plants now in the country. There were as many as 30 chlor-alkali plants in the United States at one time.

The HoltraChem facility has been owned and operated by three different companies. The plant began operation in 1967, under the ownership of International Minerals and Chemical Corporation (IMC), which in the 1990's became known as the Mallinckrodt Group Inc. (Mallinckrodt). In 1974 IMC transferred the plant to Sobin Chemical, a subsidiary that was 80% owned by Mallinckrodt which in 1977 merged back into IMC. In 1982 IMC sold the plant to LCP Chemicals and Plastics Inc (LCP) which changed its name in 1988 to the Hanlin Group, Inc. (Hanlin). In 1991 Hanlin filed for bankruptcy. HoltraChem Manufacturing Co. L.L.L. (HMC) purchased the property from the Hanlin bankruptcy estate in 1994.

A site investigation, completed in 2000, determined that the HoltraChem property was contaminated with mercury, chloropicrin and several volatile organic compounds. Sediment in the Penobscot River is also contaminated with mercury from the site. Additional investigation in 2001 revealed the presence of mercury and polychlorinated biphenyls (PCBs) at other areas on and adjacent to the site.

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The following contaminants are known to be present on site:

Air: mercury.

Biological samples: mercury.

Groundwater: manganese, mercury, acetone, m-cresol, p-cresol, 1,1 dichloroethane, 1,1 dichloroethene, cis 1,2 dichloroethene, trans 1,2 dichloroethene, carbon disulfide, carbon tetrachloride, bromoform, chloroform, chloropicrin, hexachloroethane, methylene chloride, pentachloroethane, bromodichloromethane, dibromochloromethane, methane, trichloroethene, tetrachloroethene, and 2,3,5-T. Abnormal values for pH, alkalinity, salinity, and specific conductance are present.

Sediment: mercury.

Soils: cadmium, mercury, chloropicrin, ethylbenzene, xylenes and polychlorinated biphenyls.

Surface Water: mercury, chloroform, and carbon tetrachloride. Abnormal values for pH, alkalinity, salinity, and specific conductance are present.

Under DEP supervision, HMC conducted a series of RCRA closures involving the cleaning and decontamination of RCRA units (such as tanks). Mallinckrodt is in the process of dismantling the cell building and adjacent piping/tank processes. Additional work is needed to complete the RCRA closures, this work will continue under DEP oversight.

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II. Purpose of this Document

This document summarizes and addresses the public comments received on the proposed Corrective Measures Study (CMS) submitted to the EPA in accordance with the Consent Decree entered into by the United States and Hanlin, Civil Action No. 91-0188-B (D.Ct.Maine) in 1993 and amended in 1995 to join HMC as a party defendant (the Consent Decree). This document does not address the few comments received that were not germane to the CMS and/or the corrective action process.

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The purpose of the CMS is to develop and identify all corrective measures or remedies that could achieve remediation of the site. It focuses on realistic cleanup

choices for the site based on the type and migration of the contamination identified in the site investigation. In the CMS, Mallinckrodt recommended and justified those remedial options that it felt best meets the criteria for remedy selection under the RCRA Corrective Action Program. These criteria are presented in Section VI. The findings and conclusions of the CMS was the subject of public review and comment, including a public hearing on January 13, 2004. The public comment period closed on January 16, 2004.

On December 31, 2002 the US Environmental Protection Agency and Maine Department of Environmental Protection issued Preliminary Media Protection Standards (cleanup numbers and narrative standards) and approval with conditions of the CMS workplan. The Preliminary Media Protection Standards and the CMS workplan are the basis for development of the CMS.

Accompanying the Basis Statement on the comments received on the CMS, is a Maine Department of Environmental Protection draft decision document that selects what the agency believes are the most appropriate actions to remediate the site. This decision document will be the subject of public comment and a public meeting.

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III. Summary of Comments and Response to Comments

KEY TO COMMENTORS

| CODE | NAME AND ORGANIZATION | RESIDENCE | REPRESENTING/ MEMBER OF |
|-----------|---------------------------------|------------|--------------------------------------|
| Belliveau | Mike Belliveau | Bangor | Environmental Health Strategy Center |
| Cartier | Wayne Cartier | Orrington | |
| Covert | Christine Covert Gray Parrot | Hancock | |
| de Rivera | Margaret de Rivera | Orland | |
| Duft | Patricia Hitt Duft | Missouri | Mallinckrodt |
| Hanes | Jay Hanes | Winterport | |
| JDK | John Dieffenbacher-Krall, MPA | Hudson | Maine People's Alliance |
| Leslie | Heather Leslie | Orrington | |
| NRCM | Nick Bennett, NRCM | Hallowell | Natural Resources Council of Maine |
| Peavy | Nancy Peavy Boyd Johnson | Augusta | |
| Rjudd | Richard Judd | Orrington | Maine People's Alliance |
| Wanning | Rufus Wanning | Orland | Maine People's Alliance |

Index to Document

| | |
|---|---------|
| I. Introduction | Page 1 |
| II. Purpose of Document | Page 2 |
| III. Summary of Comments and Response to Comments | Page 3 |
| Index to Document | Page 4 |
| Corrective Measures Study | |
| General | Page 5 |
| Landfills and Landfill Ridge Area | Page 12 |
| Cell Building and Soils | Page 16 |
| Soils | Page 19 |
| Surface Water | Page 23 |
| Sediment | Page 23 |
| Groundwater | Page 24 |
| IV. Court Case | Page 24 |
| V. Interim Actions | Page 24 |
| VI. Future Decisions | Page 25 |
| VII. Attachments | Page 26 |
| Attachments 1 | Page 27 |
| VIII. Project Timeline | Page 26 |

General

1. Comment

This email is to urge your program to decide to take all the mercury out of the Orrington Area and the Penobscot River. (Covert)

Response

The Department shares the commentor's concerns with the mercury on the HoltraChem site and in the Penobscot River. It is however, impossible to remove all of the mercury from these areas. While a significant amount of mercury is being removed, it just is not possible to remove all the mercury when it is located in diffuse amounts.

2. Comment

The format of the CMS Study is confusing the figures and tables should have page numbers. We also remain committed to have all HoltraChem printed material posted on the DEP website. (JDK)

Response

The Department is maintaining a website with applicable documents as well as other information, such as the current status of the removal activities.

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3. Comment

The Council is quite concerned about the approach in this study. There is a heavy emphasis on in-situ remedies that would leave highly contaminated wastes in contact with groundwater in many places. In addition, there appears to be an equally strong emphasis on minimizing short-term risks and remedial costs at the expense of dealing with long-term risks to human health and the environment. Mallinckrodt takes this approach but cites no quantitative comparison of short-term versus long-term risks to justify it. The Council believes that greater emphasis needs to be placed on preventing long-term risks unless there is strong, quantitative risk assessment information that indicates the short-term risks potentially associated with more permanent remediation of the site outweigh the long-term benefits. Input from the surrounding community will be critical in this decision, because they will have to live not just with the short-term risks of a more permanent cleanup, but also with the long-term risks of leaving the large quantities of hazardous materials in place that this study calls for (NRCM).

Response

The Department shares the commenter's concern that the corrective measures adopted for the HoltraChem site must address both short- and long-term risks. The Preliminary Media Protection Standards (PMPS) for the contaminants of concern were intended to address risks of both durations. The Department feels that the recommended corrective measures will achieve these standards. In particular changes were made by the Department to significantly reduce the amount of waste in contact with groundwater. The Department remains

concerned however with the risks associated with the excavation of the five landfills, particularly when the landfills currently are in relatively stable condition. See also response to comment #4.

4. Comment

The Council is very concerned by the approach outlined in the Mallinckrodt CMS. It places a heavy emphasis on in-situ remedies and asserts that ex-situ remedies that would result in more permanent site cleanup would be unacceptably high without providing any quantitative justification for this conclusion. The CMS also provides no estimate of the long-term risks associated with leaving large amounts of highly toxic materials in place in contact with groundwater and relies on groundwater treatment in perpetuity to prevent waste from spreading off-site. This is unlikely to be effective. Clearly, more attention and study needs to be given to more effective and permanent remedies that do not simply leave large quantities of hazardous materials in place. Careful consideration of the needs of the community must also be given because the community will have to live with both the long-and short- term risks of remediation.(NRMCM)

Response

The Department concurs with the commenter that long-term attainment of the PMPS must not rely entirely upon measures that require active remedial measures such as continuing pumping and treatment of contaminated groundwater. However, the Department recognizes that the excavation, handling, transportation, and offsite disposal of mercury-contaminated media also creates risks. The Department believes that disposal of soil and sediment onsite and isolated from groundwater in an aboveground waste management unit will provide long-term protection to residents near the HoltraChem site, while avoiding the risks of excavating and transporting large volumes of contaminated media over public roads.

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5. Comment

I have glanced at the latest clean up plans from Tyco International and still wonder if it is ethical that they own one of the companies responsible for the toxic waste site and own a company charged with environmental oversight of the site. (Leslie)

Response

This individual appears to be commenting on the previous contracting arrangement under which Earth Tech was running the wastewater treatment plant and providing security for the facility. After Earth Tech had the contract to perform these duties, Mallinckrodt was purchased by Tyco (parent company of Earth Tech). Since that time, the Earth Tech contract has expired and CDM is now performing these tasks for Mallinckrodt.

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6. Comment

A family lives in the house just downwind, downstream of HoltraChem and PERC. The dad is Lex Lindsay who told me that the owner is very concerned about his water quality. David Webster noted that when the Webster's lived at that house, one of their horses died of leukemia. (Leslie)

Response

The house in question is upgradient/side gradient from the contaminated groundwater emanating from the HoltraChem property and is unlikely to be effected by groundwater contamination from HoltraChem. Of the three main chemicals released at the facility; mercury, chloropicrin and chlorine, none are classifiable as a carcinogen.

7. Comment

Dr. Richard Smith, former president of the doctors' bargaining group at EMH told me how doctors had suspected a cancer cluster from the chemical plant. (Leslie)

Response

{Waiting for response from Maine Cancer Registry}

8. Comment

On May 14, 2002, a WABI TV news representative explained how HoltraChem was "Maine's dirty little secret" and that with railroad knowledge, cars of hazardous waste from paper mills were delivered to HoltraChem where they would be mysteriously emptied overnight and filled with chlorine to be sent back to the mills. (Leslie)

Response

This comment was made during the public comment period on the Preliminary Media Protection Standards and the Corrective Measures Study Workplan. It was determined to be unfounded. See also response to comment #55 of the December 31, 2002 Basis Statement and Response to Comment, www.maine.gov/dep/rwm/holtrachem.

9. Comment

Chlorine was the first product used for modern gas warfare, first by itself and later as a dispersing agent for other more toxic chemicals. Do you suppose the chlorine helped to disperse the elemental mercury air pollution from HoltraChem? (Leslie)

Response

Although mercury vapor can react with chlorine to produce mercuric chloride this is an unlikely dispersal mechanism. Chlorine has a vapor density of 1.29 and therefore stays close to the ground. Any releases of chlorine would be

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immediately apparent to people in the area as a low greenish cloud with a distinctive odor. A history of chlorine releases from the plant was reported in the December 1998 Site Investigation Report by Camp Dresser & McKee. Several small releases were reported as well as a 50-300 gallon spill in December 1989 and a 1300 pound spill in November 1997. Chlorine reactions with mercury vapor would be limited to the duration of chlorine gas release, and would impact the form of mercury only while the air concentration of both chlorine and mercury was sufficient to bring these chemicals into direct contact.

The most important dispersal factors for mercury in air are temperature and direct exposure to air currents. Vaporized mercury is commonly lost to the atmosphere without the help of chlorine. Mercury is an unusual metal, a liquid at ambient earth temperatures, it has a vapor pressure of 24mm Hg at 25° Centigrade.

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The Department agrees that chlorine was utilized as a chemical choking agent in warfare. It was used extensively in World War I. Research into warfare agents including the book History of Chemical and Biological Warfare: An American Perspective by Jeffery K. Smart, M.A. [Command Historian, U.S. Army Chemical and Biological Defense Command, Aberdeen Proving Ground, Maryland] fails however to offer any evidence that chlorine was ever used as a dispersing agent.

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10. Comment

State Toxicologist Dr. Andrew Smith advised me about mercury pollution and how any disturbance to the site must be done in "a closed system". I have no idea how you will do that for the river. But I think you should proceed very cautiously and honestly because a lot of folks beyond Maine are depending on an ethical outcome in this case. (Leslie)

Response

The Department is very concerned that the remediation be done in a manner that will not cause the ambient air guideline to be exceeded offsite. Air monitoring is being conducted now during process systems dismantling and will be continued as a part of the onsite remediation and sludge removal from the River. If air monitoring determines that unacceptable releases are occurring, work practice changes, cessation of activities, or other mechanisms will be instituted to reduce air releases.

11. Comment

As far as some of the other alternatives that Mallinckrodt has written down you are going with the lowest bidder.

And with CDM's summary that you had, some of the actions say excavation. But CDM was just saying, no, we are not going to excavate. Are you going to cap it, are you going to bury it, are you going to remove it. (Cartier)

Response

The Department is proposing that the Mallinckrodt plan be approved with modifications. The most important being to make sure that the waste and soil is elevated above the water except where studies have not shown leaching of hazardous constituents. Two major changes are needed to satisfy this requirement. The first is that landfills #3 and #4 will need to be isolated from becoming wet or they will need to be excavated and moved into a consolidation area or to an off site disposal facility. The second is that any consolidation area for contaminated soils needs to be elevated above the groundwater table.

12. Comment

I am hoping that if indeed the Town of Orrington inherits this piece of property, or that the Town of Orrington sells this piece of property to a prospective manufacturer, that the ownership of the mercury in this area will be retained by Mallinckrodt, so that they will still be responsible if indeed further cleanup is mandated down the road, and they would be responsible for cleaning that up.

I would like to see some very explicit language in the final part of this project that retains that liability to Mallinckrodt, rather than to the town or for any manufacturer that might come in there (JDK)

Response

Mallinckrodt retains the liability for the site even after remedial measures are installed. In addition it is common practice for new developers to conduct site assessments prior to locating on an industrial property. This helps to protect them by establishing baseline conditions prior to operation. Finally the area of the site that is most likely to be developable is that portion that was not utilized for industrial operations, roughly 158 acres.

13. Comment

I am dismayed that Mallinckrodt seem to have about a 30-year time frame. And to the folks who live in this area, there is a much broader time horizon. I would like to see my children, my grandchildren, and my great grandchildren live in this area in complete safety.

So, I would like to see in this final report measures that are finally taken, very explicit language that says that, as long as there is mercury on that site, that there will be remediation and management and, above all, monitoring continuing as long as there is mercury on that site.

If we are going to be stuck with that mercury indefinitely, I would like to see you people [Mallinckrodt] there indefinitely as well. (JDK)

Response

Like most contaminated sites, the site will need to be maintained indefinitely. Monitoring will continue until at least the media protection standards are

achieved. If at any point in the future the remediation is found to be inadequate, Mallinckrodt will be responsible for eliminating any deficiencies.

14. Comment

A lot of concerns at this site are related to the fact that mercury is a persistent and bioaccumulative and toxic chemical. And as an element and its compounds having the properties consistent with this accumulation, we need to have a long-range view about a solution for cleaning it up. And that should give some greater premium to long-term reliability and effectiveness in choosing corrective actions at this site.

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I took a look at Table 2-2 in the report, volumes in the contamination range for plant area soil. And I did a very quick, back of an envelope estimate that, not including the landfill, it would be perhaps more than 12 tons of mercury left on site when this corrective action plan was implemented, as proposed. So, that would be more than 24,000 pounds of mercury. That does not include the landfills, because no estimates were provided for the amount of mercury in landfills. I believe there is some 13 tons of mercury sludge, mercury-bearing sludge, in those landfills and there may be more material than that. So, clearly a lot of mercury is planned to be left on site. And this is of concern, given its persistence and its potential for escaping over periods of decades, and even hundreds of years.

The people have already made mention that the landfills, for which we do not have an estimate of mercury content, at least two of them that have already been capped appear to be leaking. And that is not addressed in this plan. How will they be remedied?

For the various action alternatives that are proposed in this plan, if you look at them, one by one, and measure them against their projected long-term reliability and effectiveness, they come out short.

If you look at the action recommended for the cell building and contaminated soils, the proposals only ranked moderate in terms of its long-term reliability and effectiveness.

If you look at the proposal for landfill 2, and the Landfill Ridge area soils, the proposed action is only ranked moderate in terms of long-term reliability and effectiveness.

The same for the chloropicrin spill area. And if you look at the Southern Cove site — that is where mercury is in contact with the Penobscot River—the long-term reliability of the proposed action is ranked as moderate.

Given the amount of mercury proposed to be left on site, and the inherent properties of mercury, it being extremely long lived as an element in the

environment, and its proven ability to be subject to methylation and bioaccumulation. We need to do better than moderate for long-term reliability and effectiveness.

If you add up the projected costs for those proposed actions, not including the groundwater treatment programs, the action plan proposed, it is estimated would cost about 20 million dollars to achieve a moderate level of long-term reliability and effectiveness.

If you look at the other options that this plan proposes to reject, which are scored high in long-term reliability and effectiveness; if you have a cleanup plan that costs somewhere between 30 million dollars and 60 million dollars, it seems to me that the level of investment to provide a much higher degree of projected long-term reliability and effectiveness, which because of the nature of the material we need to be concerned, about for, literally, hundreds of years, it is worth it for the people and the environment in this area, as well as the broader region of the Penobscot Valley.

And we know that mercury does not respect borders, and, unfortunately, the sad history of this site is, many, many more tons of mercury have already escaped from the site through air emissions and in discharges to the river. And we can not retrieve those, but we can do better than what is proposed here and ensuring what remains on the site is properly excavated, removed, and interred in a licensed hazardous waste landfill. And to provide the high level of long-term effectiveness and reliability that Penobscot River and the people and other animals that depend on this region deserve. (Belliveau)

Response

The Department agrees with the commenter that long-term effectiveness and reliability must be principal considerations in choosing the remedial measures for the HoltraChem site. Mallinckrodt assigned the "moderate" rating to its preferred remedies' *Long-Term Reliability and Effectiveness* based on their reliance on collection and treatment of groundwater. We note that Mallinckrodt rated only offsite disposal alternatives "high" for this criterion. As mentioned in an earlier comment, offsite disposal introduces unique risks of its own. However, the Department concurs with the commenter that measures, which require operation of mechanical equipment and daily maintenance far into the future, do not meet the requirement for long-term reliability. While we believe groundwater collection and treatment is necessary initially, an acceptable remedy must prevent the further contamination of environmental media, so that active remedial measures can be phased out as soon as possible. The Department believes the actions it proposes will accomplish this.

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Landfills and Landfill Ridge Area

15. Comment

We are writing to urge the DEP to hold mercury polluters to the highest standards of clean up to protect Maine's people and environment. These polluters should be forced to pay for the removal of all the contaminated material from the existing landfills on the Penobscot River. The proposed containment is grossly inadequate for a material with the toxicity and persistence of a neurotoxin like mercury. Maine taxpayers should not be responsible for the cost of this clean up. The public should not bear the cost for private profit making. (Peavy)

Response

The Department shares the commentor's concerns with the mercury contamination at the HoltraChem site. However, after evaluating the options for dealing with the five landfills, we have concluded that the uncertainty with moving the landfills outweighs the benefits. The possible exception is for landfills #3 and #4, if they cannot be isolated from becoming wet. Landfill #1 is located above the water table and is believed to be in a stable condition. Landfill #2 is located in the water table; however, a specific investigation into this landfill determined that mercury is not being released. Landfill #5 is the only landfill onsite which, has been regulated by the Hazardous Waste Management Rules and it is also believed to be in a stable condition. See also response to comment #16.

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16. Comment

The strong emphasis on leaving materials in place causes us concern. We see a very strong emphasis placed on leaving large quantities of hazardous materials in place and not removing it, not removing the toxicity and the volume of contaminants, only addressing mobility. As DEP has noted, landfills 3 and 4 appear to be leaking. In addition, we understand that portions of landfill 2 are in contact with groundwater and that there are erosion issues associated with landfill 1, which is very close to the river. The caps on all five of the on-site landfills are approximately twenty years old or greater. We question whether or not the integrity of those caps is still in place. The gravel pit in the landfill ridge area is also close to the river.

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The Council believes that much more consideration must be given to excavation remedies for these areas. The Corrective Measures Study simply asserts that short-term risks of any remedy other than capping in place outweigh the long-term benefits of excavation and removal, but again, no quantitative risk assessment is provided to justify this conclusion. (NRCM)

Response

Landfill 4 and possibly Landfill 3 appear to be the source of dissolved mercury routinely detected in several bedrock wells on the landfill ridge. The contaminant mass migrating from the waste is difficult to quantify but it is small compared to the mass of mercury migrating from sources in the manufacturing area. The mercury contaminated ground water flows from the landfill ridge toward the manufacturing area and from there to the river near Landfill Area 1, where it will

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be captured by the proposed ground water extraction system. {What about the .1 pound that flows the other way? Should we qualify this is some fashion?}

Despite the existence of a ground water capture and treatment system, the Department believes that it is also important to eliminate migration from the source. It is believed that the caps on landfills #3 and 4 are intact and that the problem is water wicking back up into the waste either at the edge of the cap or directly when the groundwater table is elevated. The groundwater treatment system will allow the time to implement mitigation measures at the source(s) and to monitor the effectiveness of those measures.

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Malinckrodt has indicated that improvements will be made to Landfills 3 and 4 to prevent water from contacting the waste. Some additional investigation at Landfills #4 and #3 will be necessary to convincingly determine the actual mechanism of leakage before mitigation measures can be designed and implemented. The explanation that is most plausible is that infiltrating water becomes perched on the bedrock surface and finds its way under the edge of the synthetic cap before draining into the bedrock fractures. Alternately the water table in the rock may rise into the base of the waste during major recharge events. Finally although the Department believes this is less likely, it is possible that the integrity of the synthetic cap may have been compromised. The investigation must be able to test these possible explanations and distinguish among them. The investigation may include continuously monitoring water levels in bedrock wells and overburden piezometers surrounding and within the landfills to determine when and where water is coming into contact with the waste. The Department is requiring these actions as a part of its decision.

The waste in Landfill 2 is in contact with ground water, but ground water investigations have shown that mercury is not contaminating ground water, and thus surface water, at the detection limits of the analytical methods used (0.0002 mg/l or about 0.2 ppb). The Southerly Stream runs along the western edge of Landfill 2, but the flow in that reach of the stream is so small that the streambed is accumulating woody and leafy debris and the streambed is partially vegetated. Erosion of the waste by the stream is not a concern. The absence of an identified environmental impact and the uncertainty of the risks posed by excavation and movement of landfills makes it difficult for the Department to compel source removal.

A 70' section of riverbank, near the Penobscot River, was eroding and was stabilized with a rip rap blanket. The rip rap was placed to protect the bank from eroding into landfill #1. This work was completed in 1999. A similar rip rap blanket stabilization was completed on the gravel pit side of the landfill ridge. This work was completed in 2002. These actions have stabilized the areas adjacent to the landfills. {Fred, what do you think of the risk of erosion into the landfills? Should we require an engineering assessment as a part of the decision?}

The Department has speculated about why Landfills 4 and 3 that presumably have tight synthetic liners and are above the water table most of the time appear to leak mercury, carbon tetrachloride and salt but Landfill 2 that is wet most of the time leaks only salt. Three possible explanations come to mind: (1) It could be that more water flows beneath Landfill 2 compared to the amount of water that flows beneath Landfill 4, so that the mercury discharge is diluted. (2) There might have been some difference in the composition of the waste that was disposed in the two landfills. (3) It may be that the higher leaching rate in Landfill 2 has already removed the leachable mercury whereas mercury is still leaching from the more protected waste in Landfills 4 and 3. Pre-design studies may provide additional information that may help explain this situation.

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NRCM advocates more quantitative risk measurements for the comparison of possible remedies. Some additional measurements would be useful, such as the mercury volatilization potential from landfilled sludges and contaminated soils. But it would not be possible to calculate comparable risks for removal and on site management that all reasonable parties would agree on. The arguments over the assumptions underlying in the calculations would be endless. In the Department's opinion it comes down to judgement about whether the waste can be safely managed onsite, or whether it would be better to manage the waste elsewhere. The Department believes that the waste can be handled onsite in a way that manages the acceptable risks.

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17. Comment

We would want to see more discussion of why an excavation remedy for at least some of the landfills, particularly Landfill 2, which we understand is in contact with the groundwater; and Landfill 1, which is right next to the river, are not being addressed. (NRCM)

Response

The waste in Landfill 2 is in contact with ground water, but ground water investigations have shown that mercury is not contaminating ground water, and thus surface water, at the detection limits of the analytical methods used (0.0002 mg/l or about 0.2 ppb). See also response to comment #15 and #16.

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The erosion threat to Landfill 1 has been addressed by an interim mitigation measure. The slope to the river has been stabilized. The Department does not believe that Landfill #1 is of concern for the following reasons: (1) the water table is very steep and the saturated thickness very small in this area (one to two feet at most), therefore any possible contact of water with the waste would be very minimal; (2) groundwater data suggests that the lined process lagoon is the likely source of groundwater contamination in the Landfill #1 area rather than groundwater coming in contact with waste material in Landfill cells #1a and 1b (part of Landfill #1); (3) Landfill #1 has a synthetic cover over the waste; (4) the groundwater pump and treat system will need to remain operational until the groundwater meets the Media Protection Standards; and (5) the groundwater

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pump and treatment system will allow for the identification of any possible impacts from Landfill #1, separate from the impacts from the manufacturing area.

18. Comment

Landfills 1, 2, 3 and 4, completely inadequate discussion of corrective measures, but why we are not considering excavating and possibly treating and removing it off site, or simply excavating and moving it off site. I know that Maine People's Alliance have participated in dealing with Corrective Measures, and my recollection is, in Chapter 854 is that there is a preference given to clean closure and complete removal of waste. I do not see this Corrective Measures Study, address that departmental policy. I may be misinformed, maybe it got changed. But, that is my recollection, that that is state policy, to prefer clean closure, to prefer options that remove the hazards permanently. (JDK)

Response

The Maine Hazardous Waste Management rules do stipulate a preference for clean closure for hazardous waste surface impoundments. This same stated preference is not however, present for hazardous waste landfills. Excavating and moving landfills to a new location is generally not realistic, which, is why the rules do not specify clean closure for landfills.

19. Comment

We believe also that, Maine People's Alliance, that strong consideration should be given to removal of Landfills 1, 2, 3, and 4, for the reasons already suggested. Landfill 1 is awfully close to that river shoreline.

Landfill 2, the report says that that groundwater is in contact with the waste, so therefore, it becomes contaminated, and the DEP noted it in the November 20th, 2003 letter, that at certain times there is groundwater contamination at Landfill 3 and 4. Why would you want to leave this material on site? (JDK)

Response

The landfills on site are large, but they are stable. The erosion potential at Landfill 1 has been stabilized. Ground water monitoring failed to demonstrate leakage of dissolved mercury from Landfill 2. Minor mercury leakage from Landfills 4 and 3 is probably occurring, but the total mass flux is small and would be captured by the proposed ground water extraction system. Additional mitigation measures will be required for Landfills 4 and 3 to keep these landfills dry. See also response to comments#15, #16 and #17.

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Cell Building and Soils

20. Comment

The approach for cleaning up the cell building area is unacceptably vague and does not provide a clear picture of what would be excavated and treated and what would not. The term "to the extent practicable" seems to allow an unacceptable amount of leeway to Mallinckrodt to leave as much material as it pleases in place

if it judges that removal of the material were not "practicable". No definition of practicable is provided. (NRCM)

Response

The phrase "to the extent practicable" is used to limit the required activities to those things that can be done, not compelling impossible actions.

Deleted: Webster's II New University Riverside Dictionary defines practicable as "capable of being done; feasible." It may, in fact, be practicable (feasible) to remove soils that are not practical (sensible or worthwhile) to remove. Thus, practicable is stronger language.

The Department takes the position that it is certainly practicable and useful to broadly de-water the ground in the area around the Cell Building before excavating. That will allow the evaluation of contaminant concentrations in the soil by visual and laboratory methods. It is probably not useful or practicable to remove soil deep into the glacial till layer that underlies the granular fill. The till should be very compact and rich in silt and clay, so elemental mercury should not have penetrated it deeply, the volumetric flow of ground water through the till is small so it cannot transmit dissolved mercury very rapidly, and excavation of till is often difficult due to the compaction and the frequent boulders.

It is expected that Department staff will frequently observe excavation activities and participate in decisions that might limit excavation before contamination is exhausted.

See also response to Comment 21 for further clarification of the term "practicable".

21. Comment

Excavating and treating only soil that is visually contaminated with mercury is also unacceptable. Soil could be contaminated at levels well above the PMPS without showing signs of visible mercury. In addition, this language seems to imply that only surface soils would be excavated, because visual inspections could not be performed on soils at depth. The Council believes that soil excavation and treatment must be performed on the basis of the PMPS, not on visual inspection. (NRCM)

Response

The Department agrees that all soil above the PMPS must be addressed by the chosen remedial plan. It is the Department's understanding that Cell Building soils with visible mercury will be segregated from other soils and processed or "washed" to remove the elemental mercury, and that all soils above the PMPS will be removed "to the extent practicable." Visible mercury will be located by visual inspection, otherwise soil concentrations will be determined by quantitative sampling/analysis. The Department believes that site de-watering procedures should be implemented to optimize contaminated soil removal. The following clarification was offered by CDM on behalf of Mallinkrodt in a February 3, 2004 e-mail response to DEP comments:

"The intent of this description is to provide the Department and EPA with clarification that excavation beneath and in the vicinity of the Cell Building will

be conducted to remove free elemental mercury until no free mercury is visible (or to 10 feet or 6 inches into till, whichever comes first) and to remove soils with mercury concentrations greater than the PMPS. We will remove the visible mercury or do the quantitative sampling in whatever order seems the most logical depending on the conditions beneath the cell building. After analysis of soils, any soils with mercury concentrations greater than the PMPS of 2.2 mg/kg total mercury will be removed to the extent practicable. Soil requiring excavation will be identified through a quantitative sampling program."

22. Comment

The Council is concerned about the treatment and disposal options for soils in the Cell building area. Mallinckrodt recommends either soil washing (apparently with water) or vibration to remove mercury. The Council believes more explanation needs to be provided about how these operations would be performed and the data that support their effectiveness. Where would soil wash water be stored, for example, and what means would be taken for spill control? In addition, if large volumes of soil are vibrated to separate out mercury, what measures will be taken to prevent volatilization of mercury to the surrounding air? (NRCM)

Response

The Department agrees that any process used to treat Cell Building Area soils must be designed, operated, and monitored to minimize the further release of mercury. Details including methods of soil handling, liquid storage/containment, and prevention of air emissions will be developed during the Remedial Design phase.

23. Comment

The Council does not believe that simply disposing of highly contaminated cell building and plant area soils in the "groundwater containment area" is acceptable. This will likely result in greatly increasing the duration of groundwater treatment, and since no groundwater collection system is perfect, increased flow of mercury to the Penobscot. These soils should either be disposed of in a lined disposal area isolated from groundwater on-site and capped or disposed off-site at a permitted facility. The latter option should be more thoroughly examined. (NRCM)

Response

The Department concurs with the commenter that for a remedy to be effective in the long term, soils which exceed the PMPS must be isolated from the groundwater, and prevented from leaching into the groundwater in the future. We believe that the capped, abovegrade cell the Department recommends will accomplish this objective.

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24. Comment

I do not know if you have done it or not—you worry about what is under the cell building. Have you done a core sample? Would that not tell you what is under

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there? Rather than tear the building down and then worry about what you find. It might be one of those things, do not open Pandora's Box. (Cartier)

Response

In checking with other individuals that have worked on remediations at chlor alkali plants, one of the recommendations was to not waste time and money doing soil borings under the cell building. This is because mercury is so heavy that it tends to drop downward through the soil horizon with not necessarily a horizontal movement. This makes it too dependent on placing the boring at just the right spot or risk missing the mercury. Others working on chloralkali plant clean ups have found soil borings to miss elemental mercury which was clearly evident when the structures were removed. In addition the cell building needs to be removed because of mercury contamination of the structure itself.

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25. Comment

Visual inspection of soil? And we are going to make a decision about whether we are going to remove it or not, after we spent millions of dollars to characterize this study—we have studied it for decades. It really leaves one wondering about what the intent is behind these documents.

The intent should be to clean up the site, to make sure that we protect human health and the environment, not simply to be an exercise to follow DEP and EPA regulations. (JDK)

Response

The intent of conducting a visual inspection of the soil is to remove from the site the more heavily contaminated soils, those with free elemental mercury. This will not however, be the only method employed in determining which, soils need management. Testing of soils will also be necessary to determine what soils are over the Media Protection Standards and therefore need management. See also response to comment #21.

Soil

26. Comment

I am very concerned about the proposed clean-up of the HoltraChem site on the Penobscot River. I live with my family about two miles downstream. I am aware of the hazards of mercury in the environment and the effects it has on developing children. I believe that it is imperative that the clean-up of HoltraChem site must be thorough and permanent. Any contaminated soil must not allow seepage into the groundwater forever. A 30-year containment is not enough! Please see to it that proper standards are implemented so that this site is never a problem again while Mallinrodt is still available to pay for the clean-up (Hanes)

Response

The Department believes that the recommended activities will result in a thorough and permanent cleanup of the HoltraChem site. Although it is not practical to prevent the escape of every molecule of mercury to air, groundwater, or surface water, the proposed corrective measures are intended to prevent exceedance of the PMPS. These standards are considered protective of human and ecological receptors.

27. Comment

I would like to have you respond to making that cap, your giant cat box, what it sounds like is that you are putting clay down. And, as you know, you have to change the cat box periodically. (Cartier)

Response

Details for construction of the aboveground cell will be developed during remedial design. It is likely that the cover system will include both earthen (clay) and geosynthetic ("plastic") membrane components. The function of the clay would not be to absorb mercury-contaminated leachate, but to keep precipitation out of the cell and minimize leachate generation in the first place. It should not become saturated, as kitty litter does, ~~nor need periodic replacement.~~

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28. Comment

With this chloropicrin, what is the life span of that? It is not only toxic, but explosive. And you are not going to do anything with that, and then we are worried about mercury? I would let the mercury alone and go after the other stuff. Take care of that. (Cartier)

Response

According to the Material Safety Data Sheet supplied by Vermont Safety Information Resources, Inc. chloropicrin is stable under normal temperatures and pressures. Explosive decomposition is possible under fire conditions, and tanks of chloropicrin may rupture explosively when heated. The chloropicrin contamination at this site is dissolved in groundwater and unlikely to undergo any explosive reactions in this form.

The Department agrees that chloropicrin is extremely toxic, and any handling of this chemical must be done with care. Mallinkrodt ~~must~~ consider how water contaminated with chloropicrin would be addressed in the treatment train if it were captured by the pump and treat system. This will be done as a part of the CMI phase.

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According to the US National Library of Medicine, National Institute of Health Toxicology and Environmental Health Program: "Chloropicrin is stable in neutral aqueous solution with no hydrolysis being detected after 10 days and a minimum half-life of 11 yrs¹. It photohydrolyzes rapidly in water when exposed to light below 300 nm producing CO₂, chloride and nitrate in the presence of air. Its half-

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¹ Blah, Blah, Blah, Great source, really nails the issue. Rah, Rah, Rah, Deb Stahler. Place holder for footnote.

life in sunlight is about 3 days.¹ The chloropicrin detected at this site appears to be in neutral aqueous solution, so we would expect it to remain stable in the groundwater for some years unless it is exposed to the surface environment.

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Mercury has been the primary focus at this site because it is much more prevalent and will remain a concern for much longer than the chloropicrin. The Department expects that the chloropicrin will clean up before the mercury does due to its increased water solubility over mercury. The chloropicrin will be removed through the groundwater pump and treat system which will remain operational unless the MPS for chloropicrin is met.

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29. I am concerned that this plant has most of the mercury or a lot of it staying right on site, and not even in a sealed landfill, just capped. It does not look good enough to me (Wanning)

Response

The contaminated soil and sediments remaining onsite will be isolated from air and groundwater in a cell designed for long-term performance. The cover system will be similar to that used in landfills, with multiple barrier layers. Because mercury is far more biologically stable than waste in a conventional landfill, the HoltraChem soils and sediments will not be subject to excessive settlement or gas and leachate generation from the breakdown of organic materials. The closed cell will be inspected regularly and defects repaired promptly, as required at all conventional landfills and hazardous waste remediation sites.

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30. Comment

We are concerned about the heavy emphasis on capping and leaving in place. At least, if you are going to cap it and leave it in place, we think there should be some kind of lining—lined operable unit on site where materials are deposited. There is a lot of trust placed in groundwater treatment, which looks like it would be necessary in perpetuity, and DEP comments on that again in its November 20th letter. And we know that no groundwater treatment system is perfect. And it seems that you would at least want to back that up with some sort of a liner where you are going to be exposing excavated materials, if you are not thinking about removing materials from site. (NRCM)

Response

The Department views a liner under the waste cell as a two-edged sword. On one hand a liner system would provide a means to detect and remove water which infiltrated through the cover system before it reached groundwater. On the other hand, by intercepting infiltrating water, a liner could give the appearance at downgradient monitoring wells that the groundwater had reached the PMPS and the groundwater collection and treatment system could be decommissioned. If the liner later failed, there would be no means to intercept and treat contaminated groundwater. The Department feels that at the HoltraChem site, a cell liner may only provide a sense of security while affording no real environmental protection. Since groundwater downgradient of the cell will be collected and treated until it

no longer exceeds the PMPS, we believe monitoring will provide a better measure of the cell's performance if no liner is present.

31. Comment

We think this plan relies too much on simple excavating of soil, and then moving it into the former plant area, the so-called footprint. I think there is an awful lot of reliance on pump and treat, of protecting the Penobscot River from further contamination. There is no discussion whatsoever—do we think it is going to be 5 years, 10 years, 30 years, 50 years? How long- what do we think it is going to take.

Could there be some modeling done? What is the expectation here? What happens 30 years, day one, if regulatory obligations are met, but there's still significant mercury contamination that can result in bioaccumulation (JDK)

Response

The pump and treat system will need to operate until the media protection standards are reached and can be expected to be maintained into the future. The Department expects that regardless of the remedial options selected that the pump and treat system will be necessary for decades. If after 30 years the media protection standards are still not being achieved the pump and treat system will need to continue or an alternative proposed.

32. Comment

If indeed the landfills are leaking at this point, why employ the same technology to cover over the new toxic materials. To ignore that and to go ahead and cap the materials seems a bit insane to me, with the type of leaching that you see already in these landfills. I just want to rephrase again my question that I am a bit dismayed by the amount of material that you are planning to leave on site in this area. (Rjudd)

Response

The proposed consolidation area would be constructed differently than the existing site landfills. Infiltration from surface water would be limited by an engineered cover system and the base of the waste would be separated from the water table by a capillary break which prevents groundwater from wicking up into the waste. The waste will not be placed on a low-permeability layer where infiltrating water could mound into the base of the waste. The proposed consolidation area would be built within the capture zone of the ground water extraction and treatment system, so any leakage from the freshly deposited material could be captured before reaching the river. The caps on site (landfills and new unit) will need to be perpetually maintained as they would if the waste were moved to a different site. The maintenance of a cap is considerably easier and lower maintenance than the operation of a wastewater treatment system into perpetuity. This is why the Department believes that the waste needs to be elevated above the water table in a situation that prevents water mounding into the waste.

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33. Comment

I am convinced that my sense of disquiet and discomfort with the plan here is all the more strong, because there are options that are much long-term and secure. And we can make this place a safe place to be. Otherwise, it is a toxic dump. We have permanent toxic dump in our back yard that we did not ask for. And we do not deserve to have to be living next to this in an uncomfortable and uncertain state of disquiet. This material can be removed. You do have the technology to extract that mercury out of the soil, so that when you take it off site it is not going to be that you have to take tons and tons of soil with it; you can take mostly just mercury with it and get rid of it. Then it is a storage problem. That is a different issue. Just like nuclear waste, it is long-term and you have to find a place to store it. Those are issues that have to be dealt with, and now is the time, we might as well start doing it. I would like to see a plan proposed and the money put forward. And these estimates are there of how much it would cost. And it is well worth the investment so we can have a sense of security. (deRivera)

Response

The Department agrees with the commenter that mercury should be immobilized or removed to the extent possible from any media allowed to remain onsite. The proposed remedial measures include treatment of the most highly contaminated soils to reduce their mercury content. The concentrated wastes from this process will be disposed of offsite. The Department is unaware of any technology which will remove all mercury from the large volume of contaminated media which would require treatment. Processes for chemically immobilizing mercury have shown promise at pilot scale, but so far have not operated at throughput rates needed to treat the HoltraChem soils and sediments in a practical timeframe. The Department intends to use the best soil treatment technology available and will make a final choice of treatment method during remedial design.

Surface Water

34. Comment

The Council is in general agreement with DEP's comments on surface water in its November 20, 2003 letter². However, we remain concerned that the PMPSs for on-site surface water will have an impact on the Penobscot River, given that 0.91 ug/l is much greater than background Hg levels in the river and can be expected to result in fish tissue concentrations of greater than 0.2 ppm. (NRCM)

Response

The primary source of dissolved mercury to the surface water is the discharge of groundwater. Before the groundwater collection system can be turned off, an assessment needs to be made as to what effect any discharge would have on the receiving water, including the impact on the fish tissue concentration.

² DEP. 2003. Letter from Stacy A. Ladner to Patt Hitt Duft, Mallinckrodt Inc./Tyco Healthcare. November 20. Viewed online at <http://www.maine.gov/dep/rwm/holtrachem/pdf/hittduftrevisedcmssl.pdf>.

Sediment

35. Comment

The Council is in general agreement with DEP's comments on sediment in its November 20, 2003 letter² (NRCM)

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Response

The Department acknowledges the comment.

36. Comment

In your Table 5-5, Mallinckrodt, you are going to the lowest bidder? Are we going the cheap way out? Do you want to get it done right the first time and then not have to come back, not have to worry about the next generation? (Cartier)

Response

The Department believes that the selected options are appropriate for the situation. See also responses to Comment # 4, #11, #15, #27 and #33.

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Groundwater

37. Comment

The Council is in general agreement with DEP's comments on groundwater in its November 20, 2003 letter³. In particular, we are skeptical of a remedy that essentially requires groundwater treatment in perpetuity. In addition, we remain concerned that the PMPS for groundwater will have an impact on the Penobscot River, given that 2.0 ug/l is much greater than background mercury levels in the river and can be expected to result in fish tissue concentrations of greater than 0.2 ppm. (NRCM)

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Response

The Department shares the concerns of the Council on a remedy that relies so heavily on groundwater collection and treatment. The Department believes that the contamination left on site needs to be in units/situations which, is secure and likely to remain so into perpetuity. See also response to comment #34.

IV. Court Case

A Court ordered Independent Study Panel will investigate the Penobscot River/Bay area over the next few years with the goal of reporting to the court on public health and environmental impacts. The decision on the wider river decision is deferred until the conclusion of this process. The removal of the sediment in the Penobscot River, Southern Cove, will proceed as planned.

³ DEP, 2003. Letter from Stacy A. Ladner to Patt Hitt Duft, Mallinckrodt Inc./Tyco Healthcare. November 20. Viewed online at <http://www.maine.gov/dep/rwm/holtrachem/pdf/hittduftrevisedcmssl.pdf>.

V. Interim Actions

A series of interim stabilization measures are completed or ongoing at the site:

- The decontamination and the dismantling of mercury-containing equipment in the cell building.
- The decontamination and the dismantling of equipment tank and piping processes exterior to the cell building.
- Ongoing groundwater and stormwater collection and treatment of the water along the Southerly Stream side of the plant.
- There is ongoing monitoring and maintenance. The groundwater, surface water and air is monitored.
- Removal of sediment within the plant and storm water catch basins, through catch basin socks and sweeping of the plant each spring.
- Elemental mercury was removed from the plant in September of 2002 and is in secure storage in Wisconsin.
- The landfill Ridge Area slope was stabilized.
- The retort building was sealed ~~to prevent mercury releases to the air.~~
- Groundwater collection of water leaving the manufacturing area will begin soon.

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VI. Future Decisions

After evaluating Mallinckrodt's recommendations for cleanup and other cleanup alternatives, Maine DEP proposes the attached final cleanup plan and request public input on this decision. This proposed cleanup decision will be presented to the public for comment at a public meeting. The cleanup decision must meet the threshold criteria and represent the best balance of the remaining criteria:

Threshold Criteria (General)

- ① Overall protection of human health and the environment.
- ② Attainment of media cleanup standards
- ③ Control of the sources of releases

- ④ Compliance with applicable waste management standards.

Balancing Criteria (Remedy Selection Factors)

- ① Long-term reliability and effectiveness
- ② Reduction of toxicity, mobility, or volume of hazardous wastes.
- ③ Short-term effectiveness
- ④ Implementability
- ⑤ Cost
- ⑥ Community acceptance
- ⑦ State acceptance

Corrective Measure Implementation (CMI)

Once all public comments and concerns have been addressed, and a remedial approach and cleanup standards have been selected in a final document, Mallinckrodt can begin the CMI. At this phase of the project, Mallinckrodt will write a detailed design of the final cleanup plan, which will include plans for its construction, operation, maintenance, financial assurance, monitoring and schedule. Mallinckrodt will perform the CMI for Maine DEP review and approval. The Maine DEP will continue to oversee the Corrective Actions at the site. U.S.EPA will continue to provide technical support to Mallinckrodt and the State of Maine.

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VII. Attachment.

Attachment 1. Proposed Clean Up Decision

VIII. Project Timeline

The corrective action will proceed in a series of staged events, with each one building on the previous action. The first of these implementation plans will be submitted approximately one year from the clean up decision. The corrective action implementation period is expected to last five years.

M-0503

Lavallee, Fred C

From: Beane, John E
Sent: Tuesday, January 06, 2004 11:56 AM
To: Ladner, Stacy A; Lavallee, Fred C; Stahler, Deborah
Subject: Comprehensive Monitoring Results

Attachments: HCM GW 1-2-04 new.xls

Just a few comments on the November results from the Comprehensive Monitoring sampling at HCM.

They reported the dissolved oxygen results in percent of saturation rather than in mg/l as they have in the past. It will be much easier for us if they stick to one set of units (mg/l).

The attached excel workbook contains some graphs that illustrate the following discussion.



HCM GW 1-2-04
new.xls (297 KB)...

Ferry Road Area

Over the 5 1/2 years of monitoring there has been little change in the parameters measured in the Ferry Road area monitoring wells. Electrical conductivity is elevated about ten times background. The data are scattered but reveal no convincing trends. There have been stray hits of dissolved mercury over the years, but always close to the detection limit and not repeated the following quarter.

The only two homeowner wells that are still being monitored are Safian and Hazeltine. Both appear to show some increase in electrical conductivity (salt) but no mercury has been detected.

Shutting down the plant and removing the salt pile has not yet resulted in a decrease in salt at the Ferry Road Area. CDM could be correct in attributing the salt in those wells to de-icing the access road. Alternatively, it may take some time for the salt coming from the manufacturing area to be diluted by fresh recharge. We'll just have to watch this area a while longer to see what happens.

Manufacturing Area

Electrical conductivity is pretty clearly decreasing in the near-field wells (MW502-01 and MW510-01) as the effects of brine discharges and salt storage are rinsed away. The dissolved mercury in most of the plant area wells (B326-01, MW501-01, MW502-01, MW510-01) fluctuated wildly during the time that the plant operated, but has decreased markedly since the shutdown, which supports the idea that much of the dissolved mercury in ground water resulted from operational discharges of process brine. I think the decrease will continue until the ground water mercury concentration falls to the level that can be maintained by desorption of mercury from aquifer surfaces (and dissolution from free mercury). That concentration will probably be different in each well and will be very interesting to discover.

Landfill 5 Area

The Landfill 5 wells continue to have only small concentrations of salt and mercury. Leakage from that landfill appears to be minimal, situation unchanged.

Landfill 4 Area

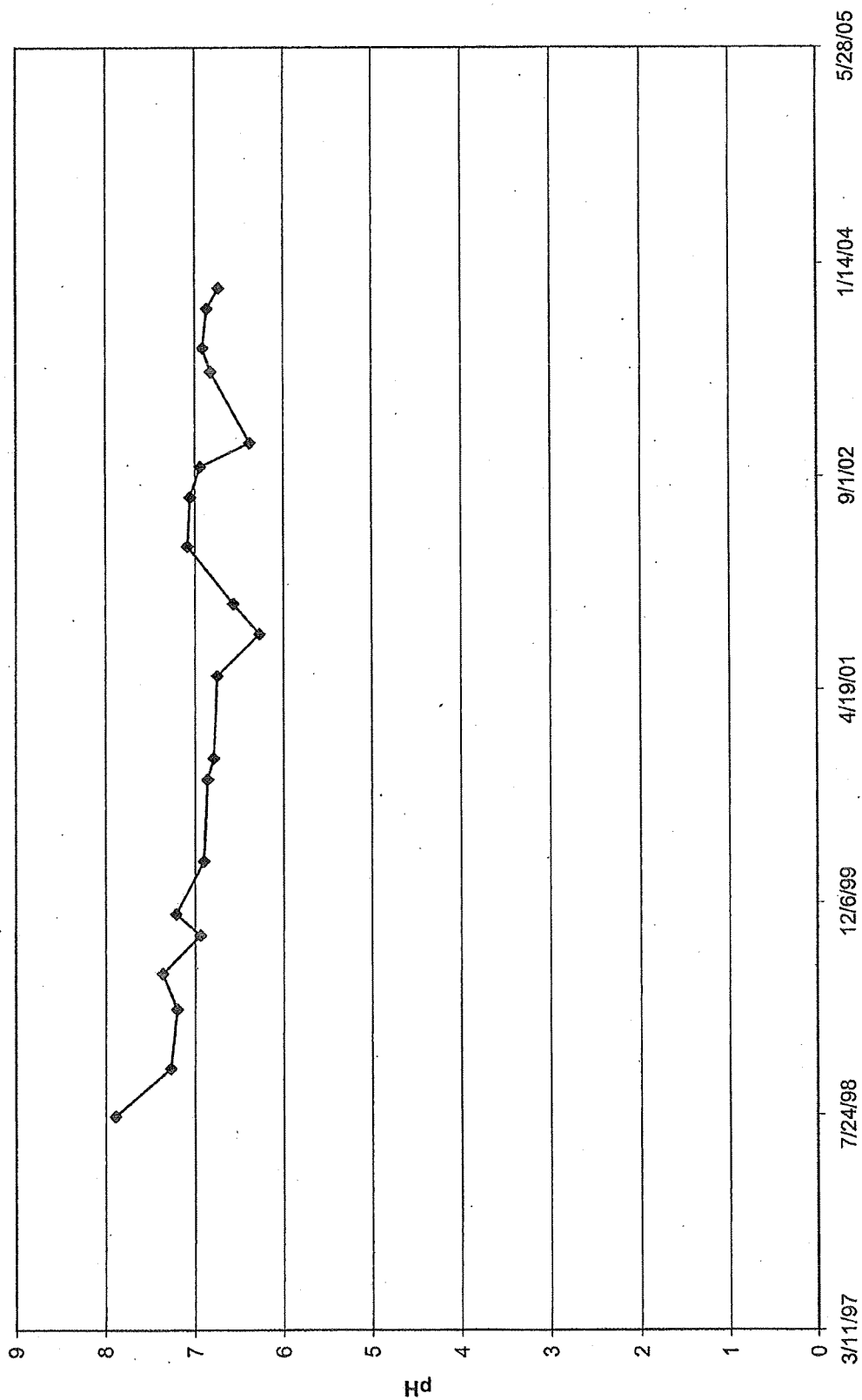
The wells that monitor Landfill 4 are contaminated with salt, mercury, carbon tetrachloride and chloroform. The landfill has been closed for more than twenty years, so the salt concentration probably reflects the rate of discharge from the waste more than it reflects the effects of leakage during construction of the landfill. Over the 5 1/2 years electrical conductivity has varied by a factor of five in MW410-B1 and a factor of 8 in MW506-B1. The salt concentration probably spikes as water levels drop and saline leachate drains from the waste, then falls again when fresh recharge flows quickly under the waste in the wet seasons. Mercury also varies widely in both wells, often near the PMPS (0.002 mg/l) but sometime spiking to ten, twenty or seventy times that value. Interestingly, the VOCs only vary by a factor of two or three. Is

adsorption/desorption more effective at damping variation in VOC concentrations than it is mercury concentrations in the bedrock aquifer?

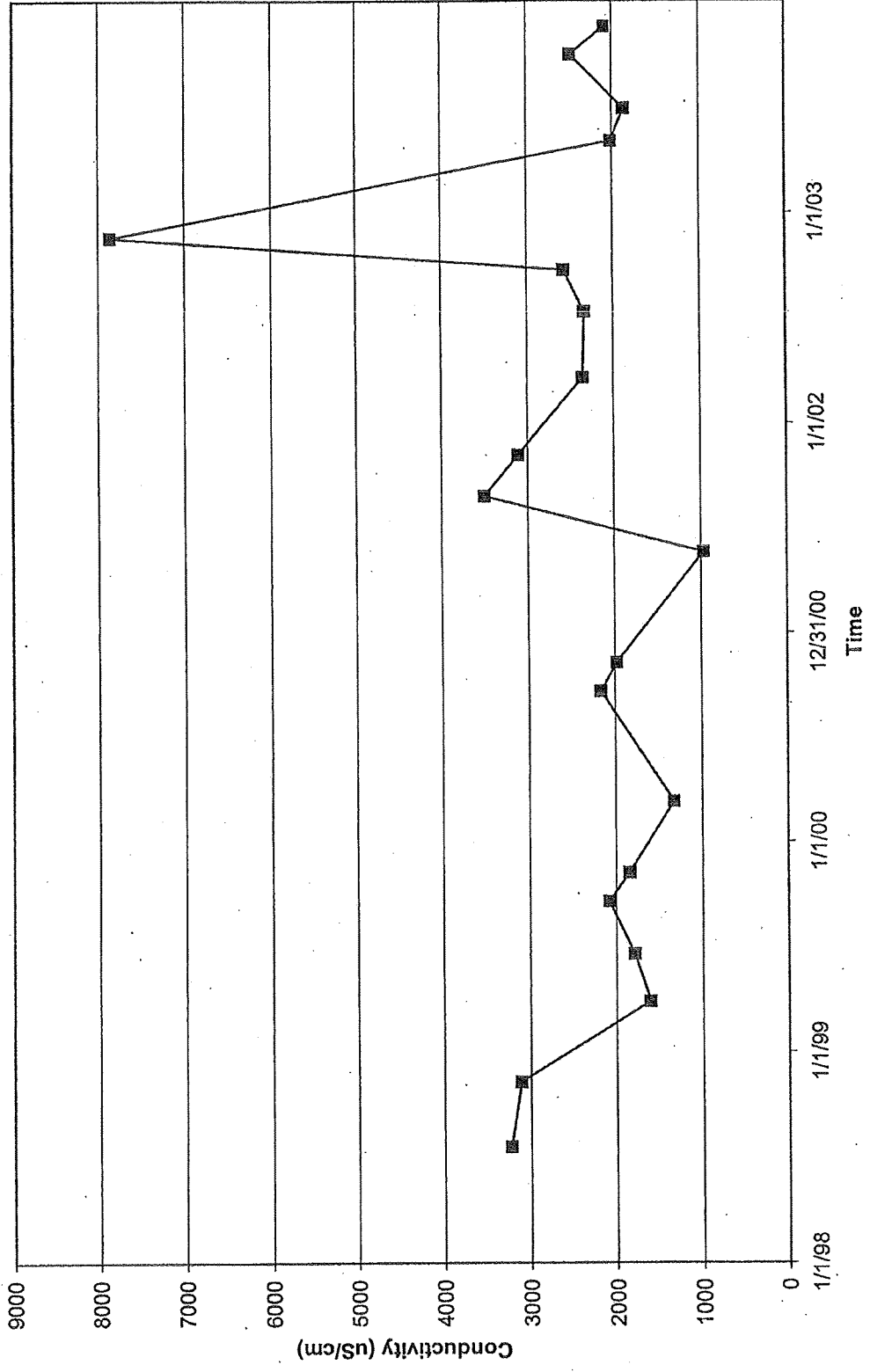
General Comments

The data from the comprehensive monitoring program has been very useful in documenting the concentrations of contaminants and the range of concentrations over which they vary in the various wells. This antecedent data will be indispensable in evaluating the effectiveness of remedial measures. I hope the Department can continue to encourage Malinckrodt to continue this monitoring until the long term monitoring plan for the site can be established.

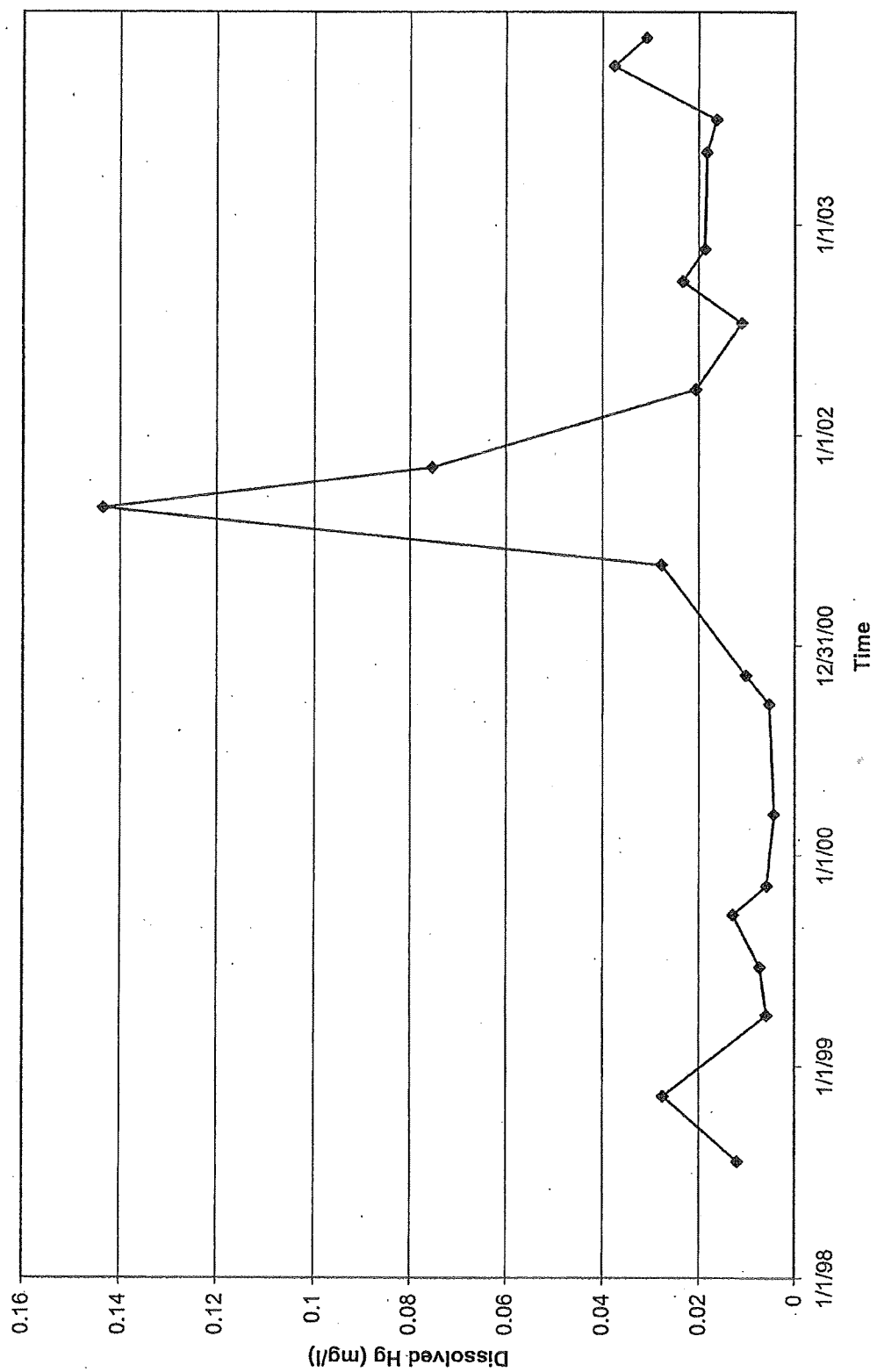
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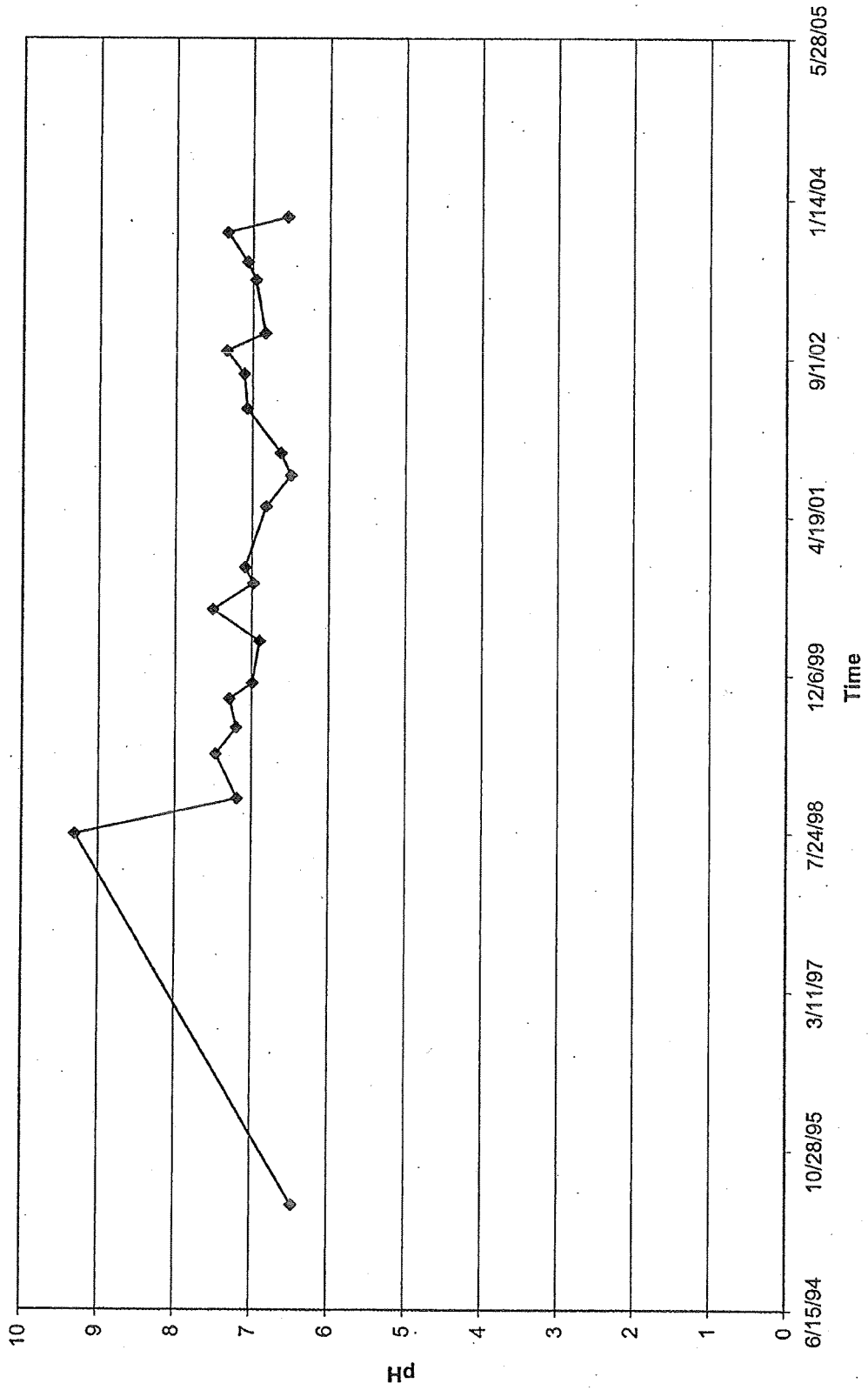
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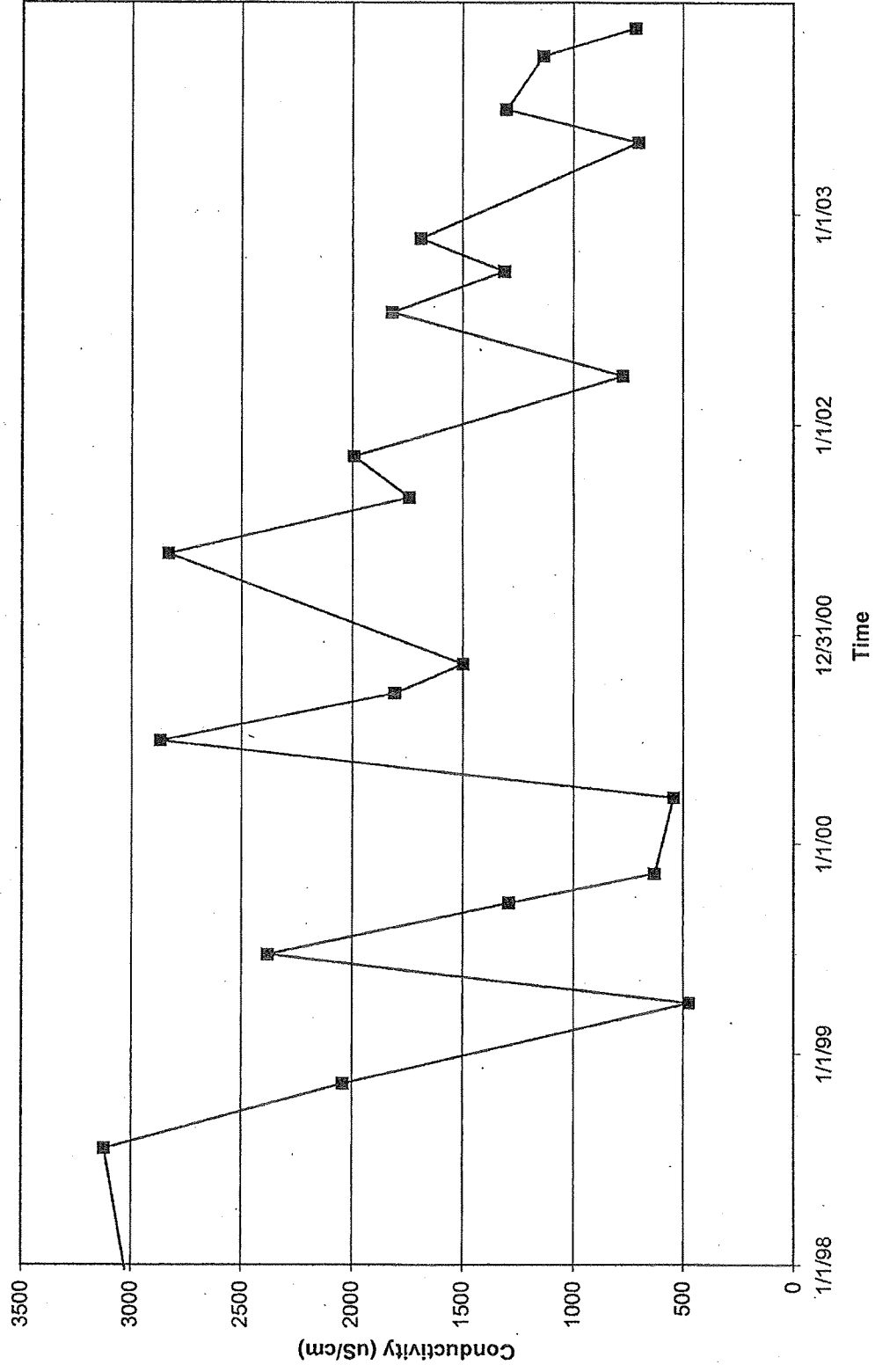
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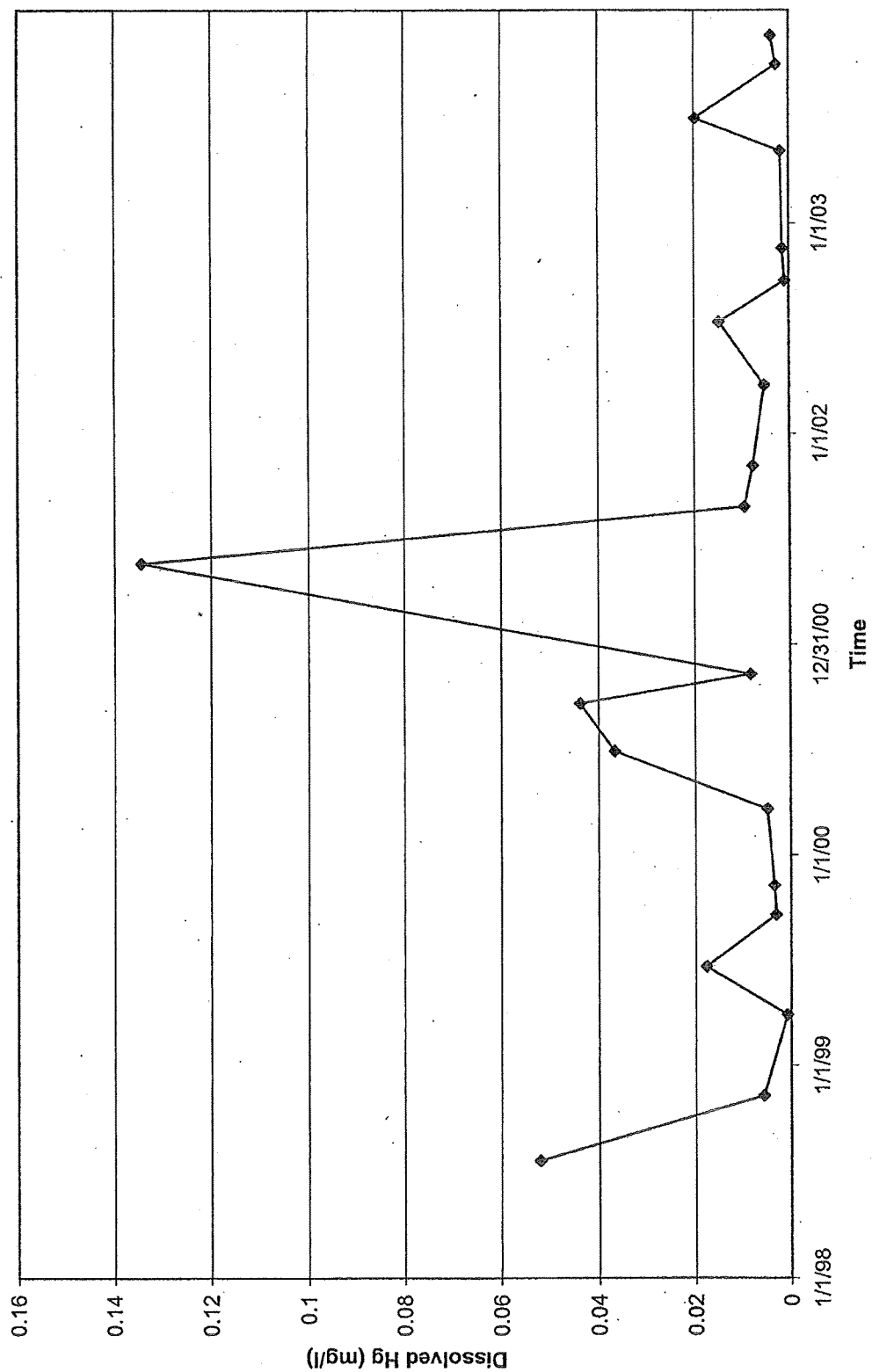
MW410-B1



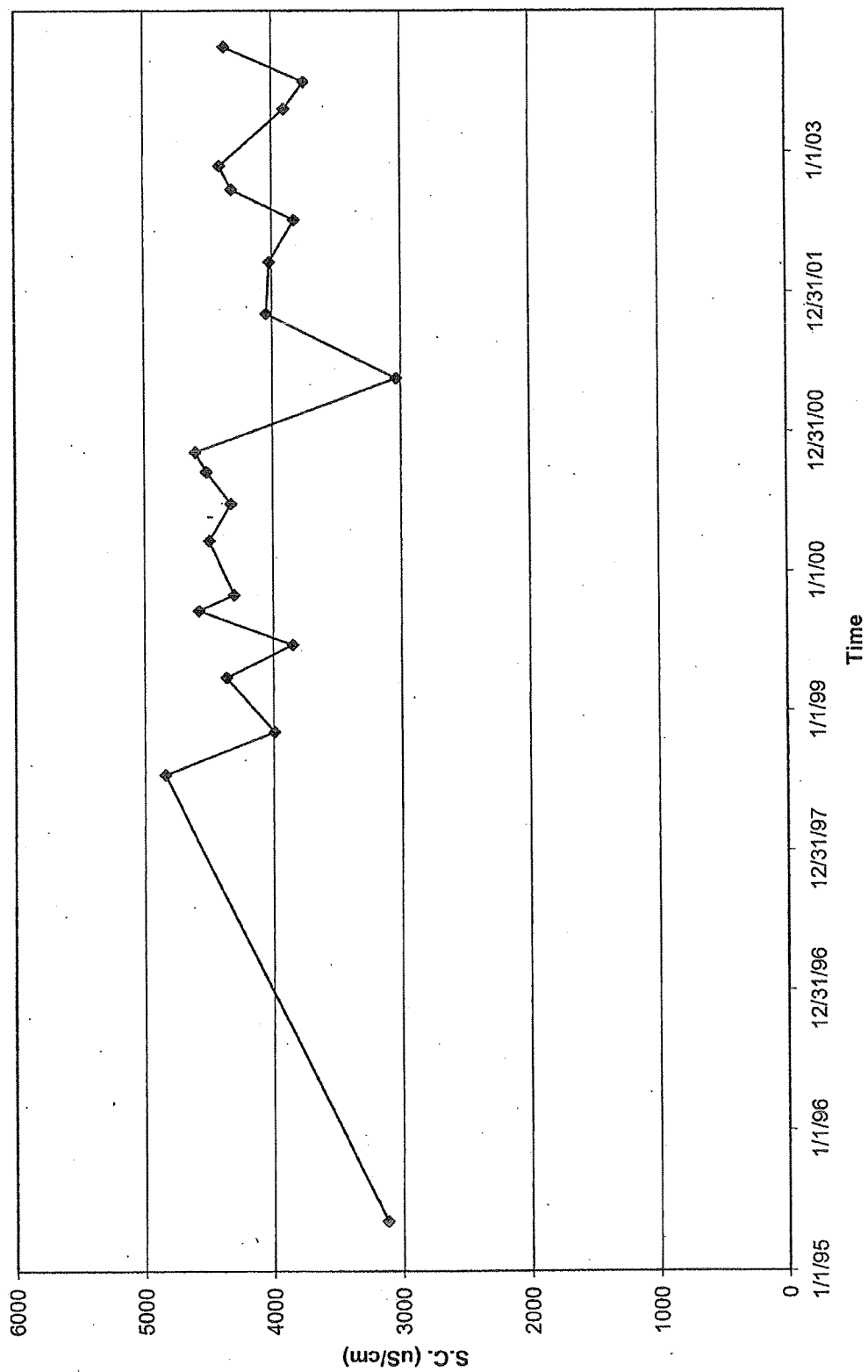
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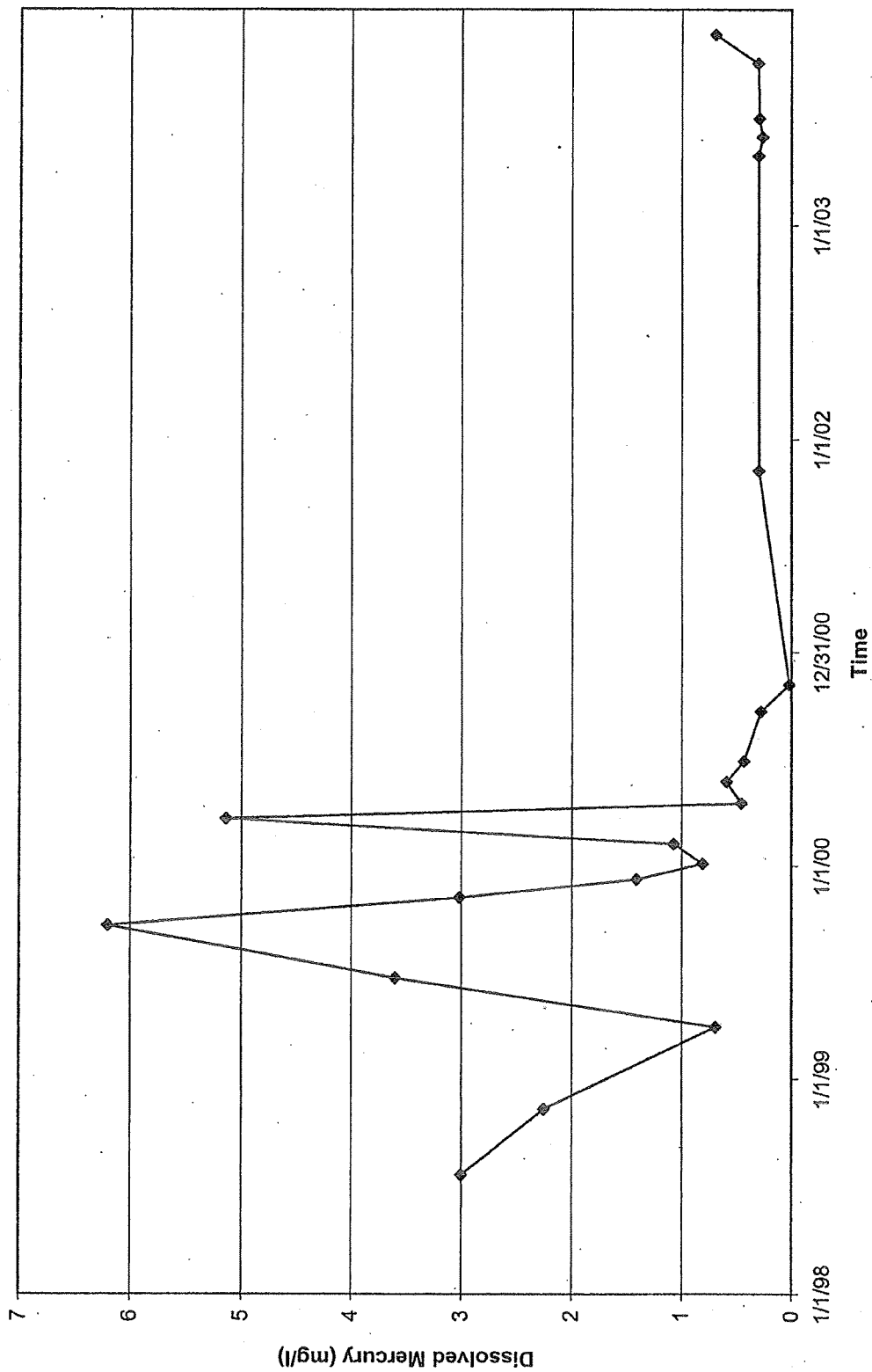
| Date | Dissolved Hg (mg/l) |
|----------|---------------------|
| 1/1/98 | 0.00 |
| 1/1/99 | 0.00 |
| 1/1/00 | 0.00 |
| 12/31/00 | 0.145 |
| 1/1/02 | 0.01 |
| 1/1/03 | 0.02 |



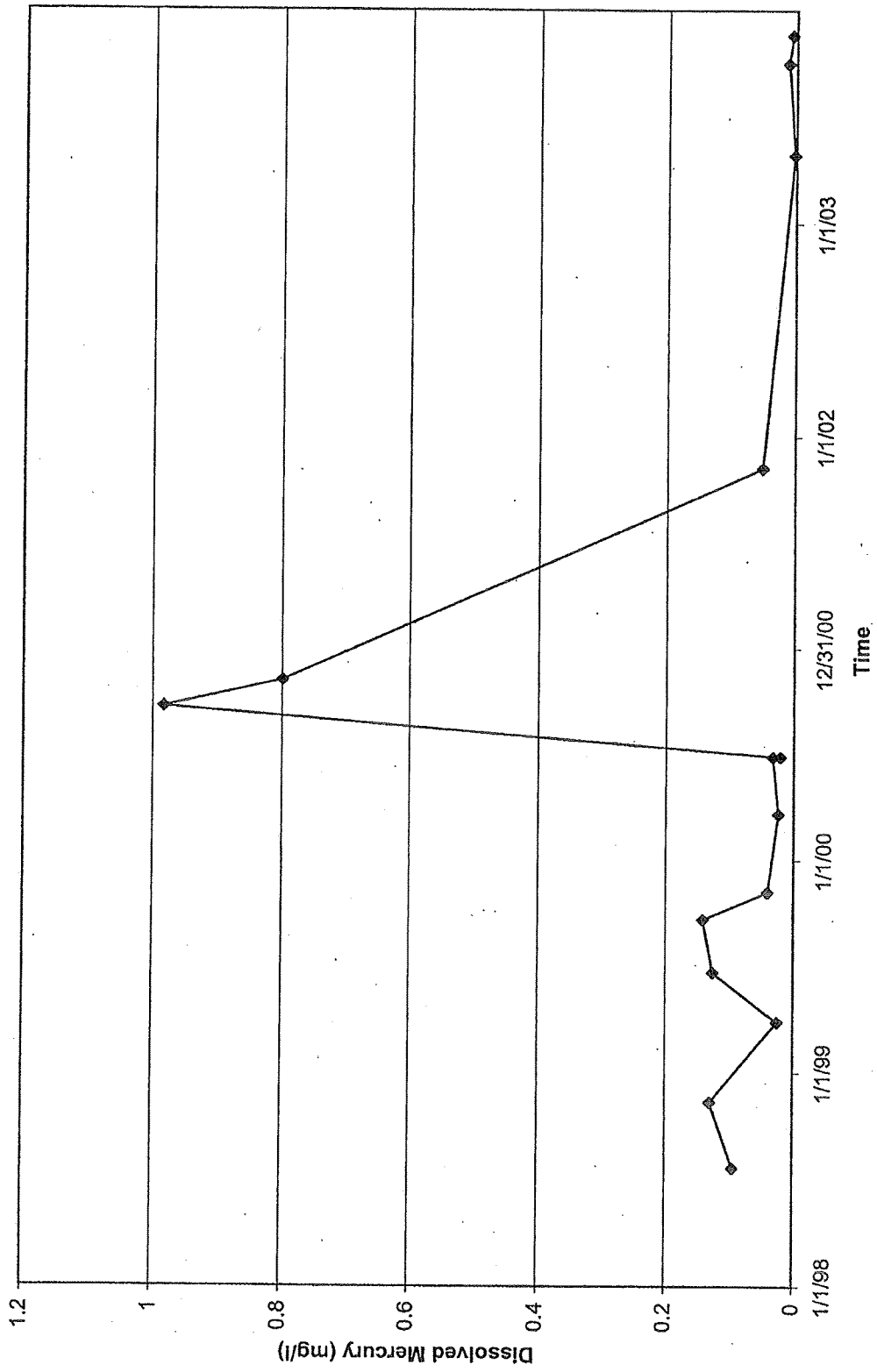
B321-B1



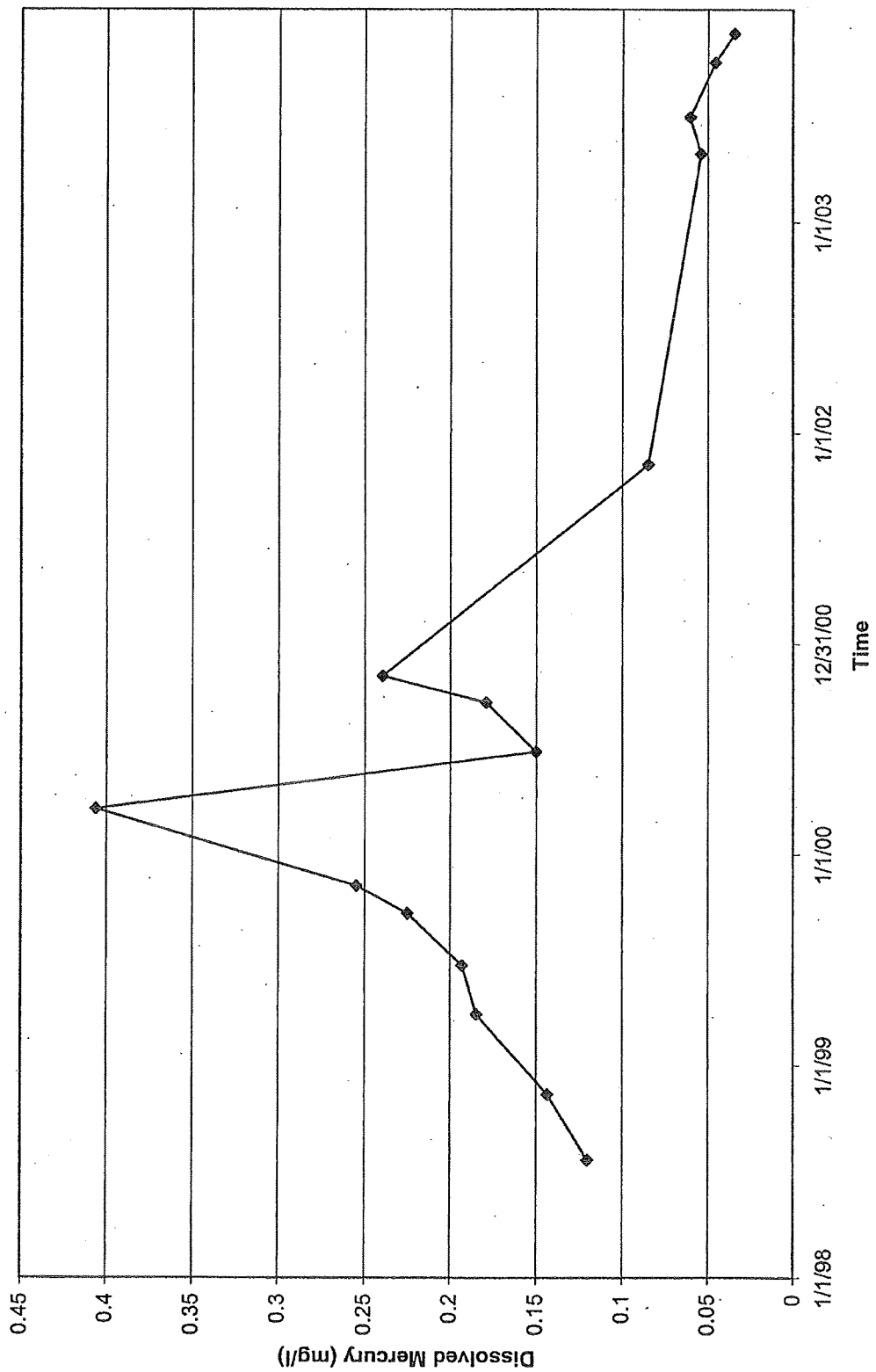
MW501--01



MW502-01



MW510-01



M-0101

M-0909